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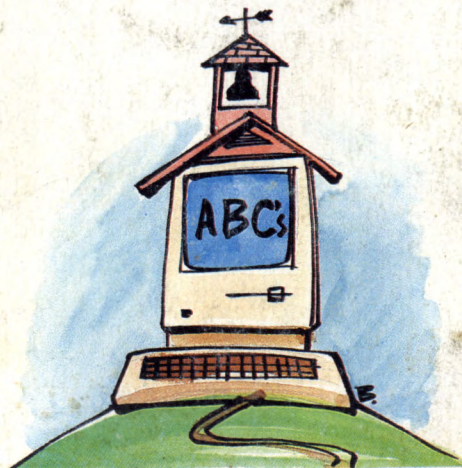
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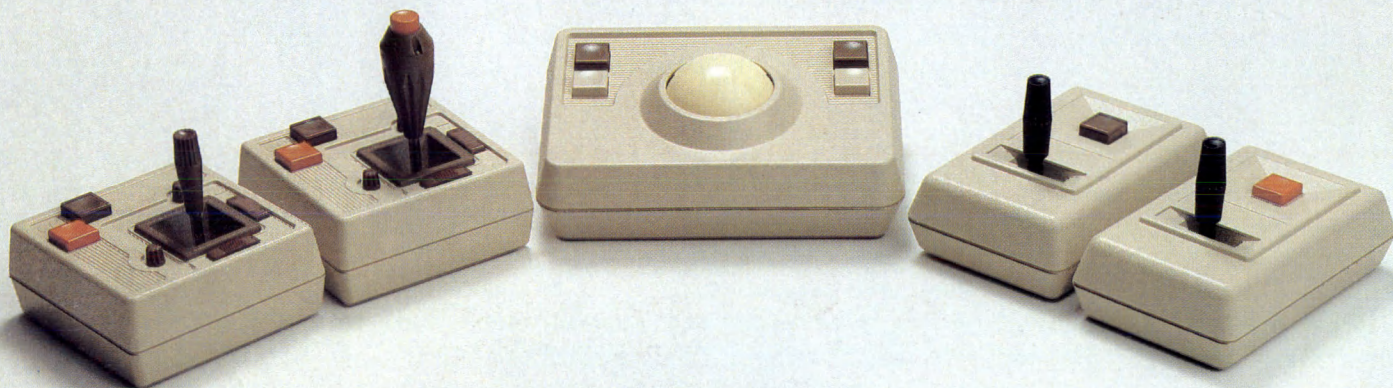
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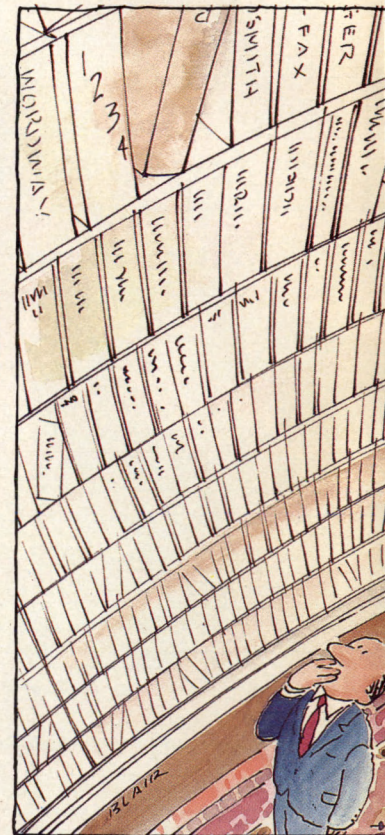
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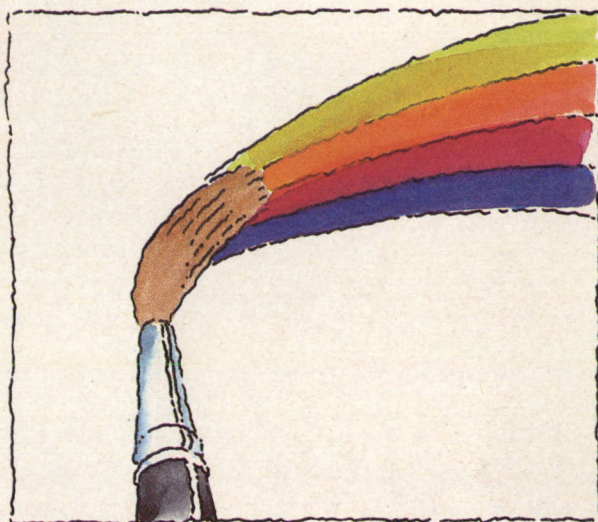
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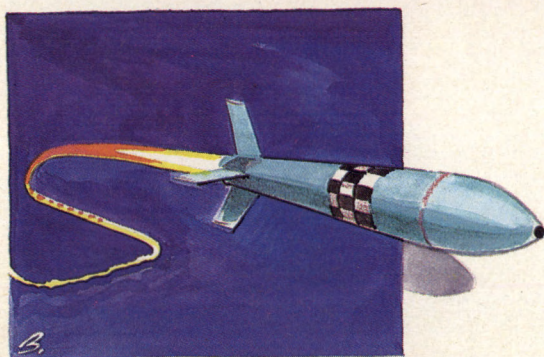
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Welcome to the premiere of COMPUTE!'s APPLE APPLICATIONS. Our first foray into exclusive Apple coverage, this special issue maintains the style, content, and approach which have made COMPUTE! and COMPUTE!'s GAZETTE the most widely read computer magazines in their fields. We specialize in providing computer users with timely information, practical applications, quality programs, and clearly written tutorials. COMPUTE!'s APPLE APPLICATIONS offers all of this and more to the Apple computer owner.

Apple computers, from the prolific II series to the fascinating Macintosh, are in millions of homes, businesses, and schools. More appear in those places every day. As recently as this last Christmas season, Apple IIe and IIc computers made up 40 percent of all computers sold in the \$500+ bracket according to some market sources. The Macintosh ended the year with more than a quarter million sold.

There's a lot of you out there. A lot of Apple owners who want clear, concise writing and applications that can be used immediately. COMPUTE!'s APPLE APPLICATIONS is our effort to

serve you, and the others like you, in the Apple world. In this first issue, we've tried to show exactly what you can expect from us. Features which provide hands-on information about landmark software, such as Lotus's *Jazz*. Buyer's guides that offer a sampling of what's available in business- and education-oriented software. How-to's to help you get started in telecommunications. Every article is informative, specific, and educational.

More than that, you'll find ready-to-type-in programs listed in COMPUTE!'s APPLE APPLICATIONS. They range from programming and professional utilities you can use to create pie charts and search through BASIC programs to games like a five-level chess game and a commercial-quality arcade game. These programs are thoroughly tested and ready to use—all you have to do is type them in.

We hope you enjoy this first issue of COMPUTE!'s APPLE APPLICATIONS. We're sure you'll find its content and quality of the highest standards.

Gregg Keizer, Editor
COMPUTE!'s APPLE APPLICATIONS

The programs included in this premiere issue are available on our companion APPLE APPLICATIONS DISK. This 5-1/4-inch disk, formatted for both DOS 3.3 and ProDOS, runs on any Apple II+, IIe, or IIc. For \$12.95, you receive all the programs in this magazine, as well as a bonus educational game, "Stargazer." Available only through COMPUTE!, this disk can be ordered by using the clip-out coupon in this issue, or by calling toll-free 1-800-334-0868.

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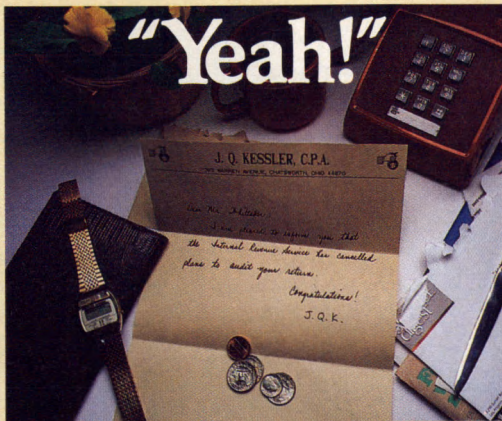
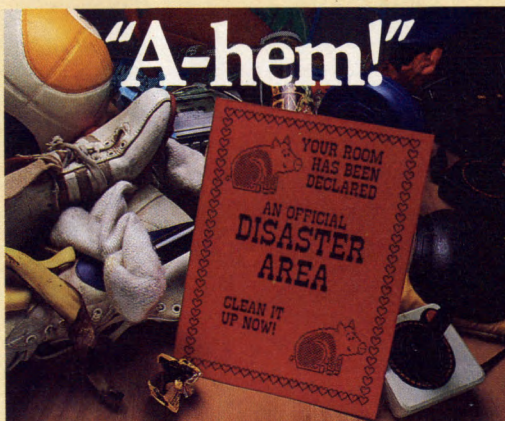
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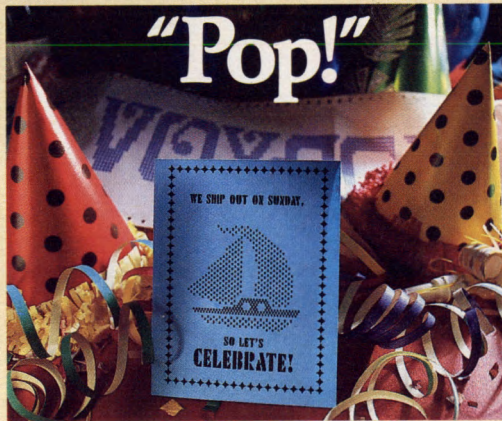
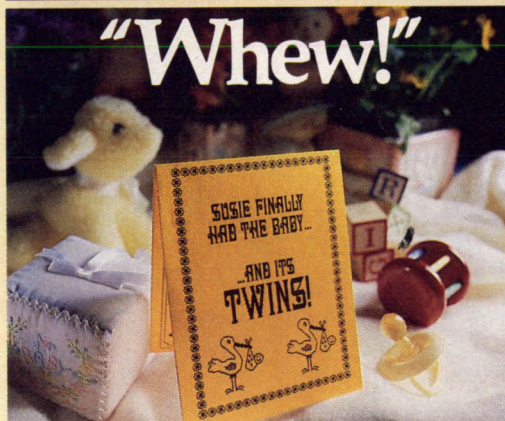
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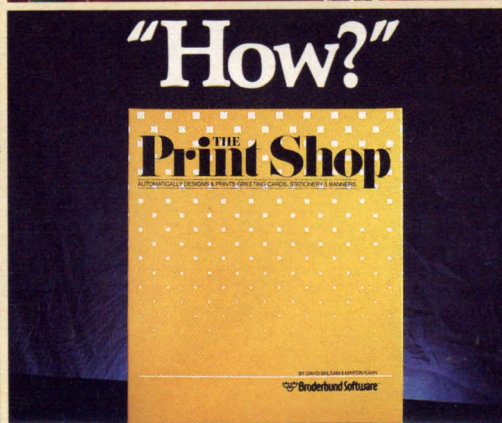
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Considering Business Software

Donald B. Trivette

Befuddled by business software selection? This introductory article shows you what to look for in spreadsheets, word processors, and database programs, the three most commonly used business packages.

Until the late 1970s, there were few personal computers—and those that existed were owned and used by hobbyists and tinkerers. Software selection was easy in those days. There wasn't any. Not so today. There are tens of thousands of programs available for personal computers, making the task of selecting one program over another as difficult as choosing just the right wallpaper.

We're going to look at three major types of business software: spreadsheets, word processors, and database programs. We'll explain—in a generic way—how these programs work; and we'll discover some of the things you, the user, should consider before purchasing any of these packages.

Spreadsheet Programs

The personal computer era really began with the invention of spreadsheet software. In 1978, Dan Bricklin sat in a Harvard Business School classroom, watching his professor laboriously create a model budget on the blackboard. Each time he changed a number in one column, it altered the numbers in every other column. Suddenly (in a flash, we're told), Bricklin imagined an electronic blackboard that would, when one number was changed, recalculate all the other numbers derived from it. Was such a thing possible?

It was. The first *VisiCalc*—for visible calculator—program was sold in January 1979; it ran on a 24K Apple computer. The *VisiCalc* program helped sell Apple computers, and Apple promoted the *VisiCalc* software—software that turns a

computer screen into an electronic spreadsheet for budget planning, financial forecasting, and virtually any task involving columns and rows of numbers.

A look at an actual spreadsheet application will help you grasp what Bricklin created. All spreadsheet programs start with a screen that looks something like Figure 1.

Figure 1: Typical Spreadsheet Layout

	A	B	C	D	E	F
1						
2						
3						
4						
5						
6						
7						

The columns, across the top, are lettered; the rows, down the edge, are numbered. The maximum size of the spreadsheet—the number of rows and columns—depends on the individual software product and the amount of memory installed in the computer. Each combination of a row and column forms a *cell* or *box* where data may be entered. Thus the upper leftmost cell is referred to as A1—column A, row 1. The current cell, the place the computer will put the data when we type, is usually shown as a white box. That box is the cursor for a spreadsheet. It can be moved up and down, left and right, by the arrow keys on the computer's keyboard. Spreadsheets for the Macintosh, of course, generally use the mouse to locate a specific cell.

Let's look at a simple spreadsheet screen for a make-believe company. An entry in a spreadsheet cell may be one of three types: character data, numeric data, or a formula which the program later turns into numeric data. We'll put character data in some cells to create headings. In other cells (B3, B4, B5, B7) we'll put numbers to represent sales. And in still others (B6, B8) we'll put a

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MegaMerge is THE mail merge program for MacWrite! With MegaMerge, you can use MacWrite to create form letters, print mailing labels and more! You can even overcome MacWrite's limited document size by "chaining" several documents together and printing them as one, long document!

MegaFiler

If you do any filing at all in your home or office, you NEED MegaFiler!

It's the file management system for the Macintosh that lets you file and retrieve information with EASE!

You can store names, addresses or other information using MegaFiler's library of ready-made files for:

- Mailing Lists
- Customer Orders and Invoices
- Home Management
- Business Inventory
- Customer Files
- And MUCH more!

You can also design your own files using MegaFiler's fun-to-use design file! You can also print lists, tables, mailing labels and MegaMerge mailing lists. You can even incorporate them into MacWrite and other Macintosh applications!

Here's what else MegaFiler can do:

- Sort information on any field.
- Find forms based on any criteria you choose. For example, find all the people who live in California whose names begin with "S" and own a Macintosh and print them in zip code order.
- You can manage several files at one time.
- You can cut information from one file and "paste" it into another.

MegaFiler is truly the file management system you've been waiting for.

Discover how super it really is!

MegaForm

MegaForm is an easy-to-use forms and reports generator. You can use MegaForm to create actual-size forms and reports such as:

- Invoice Forms
- Order Forms

- Purchase Orders
- Expense Reports
- And MUCH more!

With MegaForm you can draw forms and reports exactly the way you want them to appear. It will also help you fill out the form you just created, using MegaFiler. With MegaForm you can also draw, file, calculate and even sequentially number your forms!

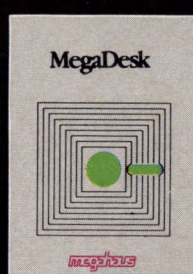
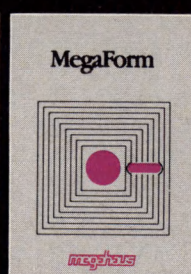
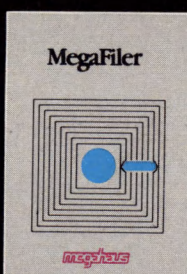
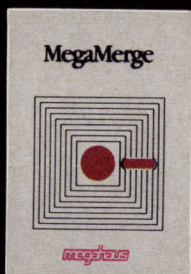
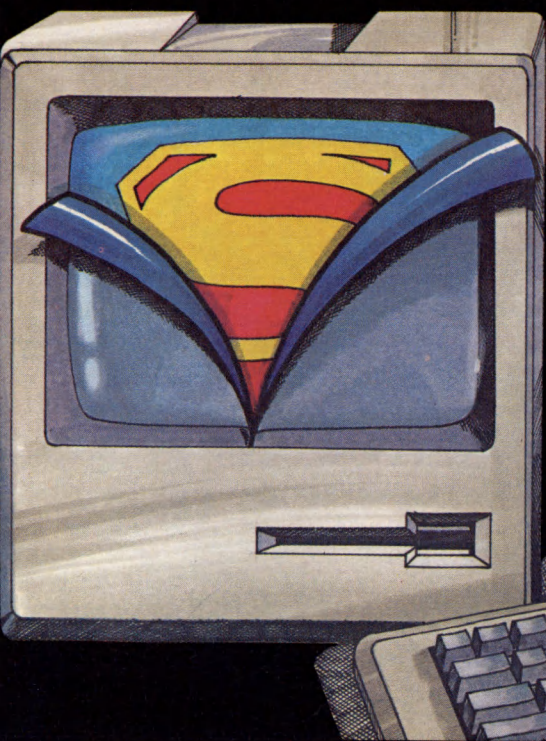
MegaDesk

MegaDesk is something almost all of us can use. With MegaDesk, you get three desktop accessories...in other words, a program that you can run at the same time as other programs.

With MegaDesk you'll get: • A **Desktop "Appointment Book"** which is a calendar that shows you month, day and date. Every day has it's own page on which you can jot down information. • A **"Quicklook"** accessory which gives you a brief look into any MegaFiler file on your desk. • A **Reference Card** accessory which allows you to flip up a "window" containing any information you choose. We supply a complete library of reference cards and you can also add your own!

The Megahaus family of software products truly does make your computer work harder and easier. They can also turn a mild-mannered Macintosh into "Super Mac"...faster than a speeding bullet.

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formula to calculate subtotal and grand total. Notice that the spreadsheet does not display the formula in the cell—it only shows the *value* the formula has calculated.

This is what makes spreadsheets so wonderful: To see how the numbers change when Division 2 sales increase, all we do is move the cursor to B4 and enter a new number. Instantly, the subtotal in B6 and the grand total in B8 are recalculated and replaced in the spreadsheet. And since a change in B4 also causes some of the numbers for February through December to change, the spreadsheet automatically recalculates those values too.

There's more to most spreadsheets than can be shown on a screen. The columns for March through December will scroll into view when we move the cursor to the right side of the screen; similarly, rows below the *Grand Total* label can be scrolled into view. The screen is just a *window* into a portion of the spreadsheet. There are other commands to delete and insert rows and columns, to move entire rows and columns to other locations, to print the spreadsheet on the printer, and to save it on a disk.

Most spreadsheet programs are very similar. They have similar commands, similar functions, and a common screen format. The one feature worth looking for is variable column width. For example, assume the far right column in the sample spreadsheet is to contain a mailing address for each sales division. You would need a column at least 15 spaces wide for the address—but not 15 spaces wide for all the other columns in the spreadsheet. Variable width columns allow the spreadsheet to present text or character data in an efficient way.

Word Processing

Today, word-processing programs probably sell more computers than spreadsheet software. Surveys show that more

Figure 2: The Data's In

	A	B	C
1		January	February
2	Sales		
3	Division 1	1000.00	1005.00
4	Division 2	1400.00	1407.00
5	Division 3	5000.00	5025.00
6	Subtotal	7400.00	7437.00
7	Mail Order	1200.00	1206.00
8	Grand Total	8600.00	8643.00

than half the people buying personal computers do so for the machines' word-processing capabilities. Virtually everyone who has a personal computer uses it, at least occasionally, for word processing. But what is a word-processing program?

It turns your computer into a "glass typewriter." It allows you to write words, sentences, and paragraphs; to store them; to edit them; and finally, to print them out as a memo, letter, report, or even a book.

On a conventional typewriter, as you create a document you also print it. With a word-processing program, however, the creation and printing are two distinct processes. Because the words are stored in the computer's memory, rather than on typing paper, you can easily correct mistakes, move sentences, and erase whole paragraphs. All at the touch of a key.

The typical word-processing program treats a document like a long scroll—as the scroll unwinds, only a small portion of the text is visible on the screen. The screen is a window into the document. There are ways to position the window anywhere in the text. You can quickly reach any part of a document to make changes. How well this works, or doesn't, is a function of each word-processing program. The ease and facility with which letters, words, sentences, even paragraphs, can be entered and edited is extremely important. That's what you'll spend most of your word-processing time doing. So there are certain features you should consider when making a selection.

- You should be able to move

around easily within a document. Are there commands, keys, or mouse moves to go directly to the top or the bottom of a document?

- The program should have block-editing features. This allows you to define a block of text—either a few words or entire paragraphs—and then move, delete, or copy the block to another part of the text.
- Global search and replace is another important feature. What if you've misspelled someone's name throughout a document? The word-processing program should be smart enough to find every occurrence of the misspelling and replace it with the correct one.

O

nce the document is entered and edited to your satisfaction, the word-processing program should be able to print it to your specifications. Here are some print features to look for.

- A word-processing program automatically starts a new page of text when the old one is full—but will it allow you to manually start a new page anywhere in the document?
- How well does it print lists and tables? Does it have a special feature to align decimal points?
- A good word-processing program will have a way to change the left and right margins within a document to print indented text. This is often called a hanging-indent feature.
- How does the program handle headings, subheadings, and

footnotes? Are they important to you?

- How much control does the program give you over the printing process? Suppose you've just printed a 20-page report and then spill coffee on page 9. Will the program allow you to print a new page 9, rather than reprint the entire report?

One feature that you must insist on is good documentation. Does the manual have lots of examples? Perhaps an instructional booklet? A thorough index is invaluable. Even the best word-processing program is worthless without a good manual.

A common mistake in selecting a word-processing program is buying one that has more features than you need. If you write only a few letters a week, or perhaps an occasional report, you'll be much happier with one of the less sophisticated, easier to use programs.

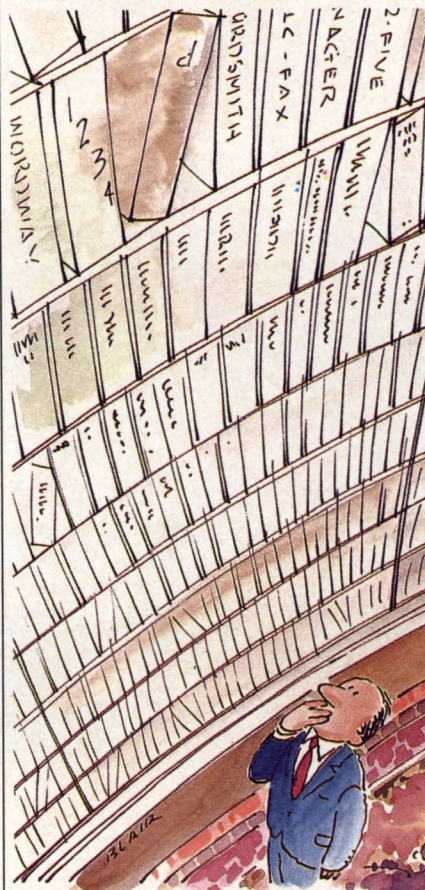
Database Management

To select a database management program, you need to learn some basic terms of data management. Any collection of information is a *database*. Consider a telephone directory—it contains names, addresses, and telephone numbers. It contains one *record* for each subscriber. Name, address, and number are *fields* in the record, fields in the database. To look up a number, you manually search the name field for a particular entry and then scan across to the phone number. A telephone directory is sorted in alphabetical order to facilitate a name search, but what if you have only the number and need a name? Or you need to match an address to an unknown name. Those searches are impossible with the phone book, but very easy for a database management program. That's the management part.

A *relational* database program is one that can relate the information from one database to the information in other

databases. For instance, the yellow pages in a telephone directory might be a second database in your computer. By relating the names of attorneys in the yellow pages to the residents living on Forest Drive listed in the white pages, a relational database program could display all attorneys living on Forest Drive.

In addition to searches, which can be quite complex, the software should be able to summarize, format, and print



reports; and it should have provisions for adding, editing, and updating data.

Setting up the database is often more difficult than using it. You must do a lot of thinking about what information it will contain and how the data will be arranged. Will there be more than one file? What keywords are needed? This is information you'll have to tell the database program *before* you begin entering data. In fact, it's information you should know before you *buy* a database management program. Once the format is established,

it's difficult or impossible to change.

When the amount of data you need to search and manipulate taxes manual methods—lists, index cards, Rolodex wheels—then the answer is likely a database program. In one sense, database programs are nothing more than your own private information utility, one in which you're the one who has entered all the information.

Software For Tomorrow

Although there is always a plethora of trends in personal computer software (which seems to change even more rapidly than computers themselves), there does seem to be a slant now toward software that is capable of doing several tasks. Some spreadsheet programs, for example, combine features of database-management software. Some database programs do word processing. Lotus Development Corporation, in fact, has announced a package for the Macintosh, called *Jazz*, which includes a spreadsheet, word processing, communications, database management, and graphics.

A truly integrated program does more than combine several programs under one name. It must be able to take the data from one task and use it in another task.

Truly integrated software is just now becoming available for personal computers. It's not getting all the pieces working together that's a problem, but rather developing a command structure which is simple to use and easy to learn. There's no profit in developing a program that will do *everything* if no one understands how it works. Fortunately, several such integrated programs are available, with more sure to come in the future. *Appleworks*, an integrated program for the Apple IIe and IIc, and *Jazz* for the Macintosh are just two programs in this new wave of software.

Business Applications

Software Buyer's Guide

There are literally thousands of programs on the market for the Apple computers. A complete listing looks something like a Sears catalog, and is usually obsolete as soon as it's printed.

Business application software, though not as large a category as educational programs, still includes hundreds of packages. Finding what you're looking for can be exhausting.

With that in mind, we've put together a business applications software buyer's guide. Obviously, it doesn't include *every* business application program on the market. We've cho-

sen packages which represent a cross section of what is available. You'll find spreadsheets, databases, word processors, financial packages, office management programs, and a variety of other software listed here.

Software which doesn't appear on this list isn't necessarily of inferior quality. On the contrary, there were packages omitted which are comparable to those that appear. We just couldn't include everything.

Note that prices and machine availability are subject to change.

Data for this guide was supplied by .MENU—The International Software Database Corporation. For further evaluative information and ordering, contact .MENU, 1520 South College Avenue, Fort Collins, CO 80524. The toll free number is 1-800-THE-MENU or 303/482-5000 (in Colorado or outside the USA). Telex ISD 454590. When ordering, note the International Standard Program Number (ISP.N).

Product	Price	ISP.N	Publisher/Vender	Systems	Description
Spreadsheet					
Creative Calc	49.95	20600-070	Creative Software	II, II+, IIe, IIc	A spreadsheet that allows you to produce models and do "what if" calculations.
Dow Jones Spreadsheet Link	249.00	26725-400	Dow Jones & Company, Inc.	II, II+, IIe, Mac	Productivity software for anyone who requires accurate and timely financial data and a means to analyze it.
Flashcalc	99.00	85350-275	Paladin Visicorp	II+, IIe, IIc	This is a financial planning and spreadsheet tool designed for home and office use.
Magicalc 2.16	149.95	05425-200	Artsci	II, IIc	A second-generation spreadsheet capable of many advanced functions. This is one of five in the Magic series.
MicroCalc	29.95	50475-210	Micro Ink	II, II+, IIe, IIc	This is a miniature spreadsheet program helpful in business, home, and school that is easier to use than most spreadsheet programs.
Microplan	495.00	12200-100	Chang Laboratory	Mac	A financial planner, an electronic worksheet, and a business planning tool designed to address business needs.
Multiplan	195.00	53150-550	Microsoft	II, II+, IIe, IIc, Mac	A spreadsheet simulator for numeric modeling and planning.
PractiCalc II	69.95	17512-375	PractiCorp	II, II+, IIe	This is a flexible, multipurpose numbers and word handler that can be used for checkbooks, alphabetized lists, and budgets.
VisiCalc	179.00	72450-300	Software Arts, Inc.	II, II+, IIe, IIc	The first true electronic spreadsheet, this program is widely used for business forecasting and analysis.
Word Processing					
Apple Writer 2.0	89.00	03900-180	Apple Computer, Inc.	II+, IIe	This word processing program allows you to create, edit, and print all types of documents quickly and easily.
Bank Street Writer	69.95	08850-030	Brøderbund	II, II+, IIe, IIc	A simple, uncomplicated word processing program often used in homes and schools.
The Correspondent	49.95	75100-220	Roger Wagner Publishing	II, II+, IIe	Designed primarily for writing letters and other documents, but includes many supporting utilities and uses.

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Product	Price	ISBN	Publisher/ Vender	Systems	Description
Creative Writer	49.95	20600-073	Creative Software	II, II+, IIe, IIc	A full word processing package that allows you to edit text information.
Executive Secretary	250.00	71800-100	SOF/SYS, Inc.	II+	A word processing program with database, mail merge, and telephone document transfer.
Format II	375.00	42650-100	Kensington Microware, Inc.	II, IIc	This is the only word processing program to come complete with the necessary cable to perform a Shift key modification.
Hayden: Speller	79.95	34925-660	Hayden Software	Mac	With a 20,000-word dictionary, <i>Speller</i> corrects errors in any ASCII format text file. User-created dictionaries possible.
Homeword Double Bundle	99.95	69925-254	Sierra On-Line	II, IIe, IIc	<i>Homeword Double Bundle</i> combines in one package the <i>Homeword Word Processor</i> and the <i>Homeword Speller</i> spelling verifier.
Letter Perfect 6.0	104.95	45100-200	LJK Enterprises	II+, IIe	An easy-to-use text editor and formatter that allows you to write and edit text files of all sizes.
Macpublisher	99.95	08268-500	Boston Telecomputer, Inc.	Mac	<i>Macpublisher</i> is a text and mixed graphics editing system that produces multicolumn newsletters, reports, and product price lists.
MacWrite	149.00	03900-417	Apple Computer, Inc.	Mac	<i>MacWrite</i> is Macintosh's native word processor.
Magic Window II 2.03	149.95	05425-500	Artsci	II, II+, IIe, IIc	Word processor with 40-70-80 column capabilities.
MegaMerge	125.00	48875-100	Megahaus Corp.	Mac	A mail merge program for <i>MacWrite</i> which allows printing of form letters, labels, and lists. Short files can be chained to create a long document.
Microsoft Word	375.00 195.00	53150-750	Microsoft Corp	II, II+, IIe Mac	A powerful word processing package which includes provisions for hooking up a mouse for pointing and command execution.
Palantir Word Processing 1.2	395.00	59624-100	Palantir Software	II+, IIe	Offers all the features expected from a dedicated word processor, including formatting, proportional printing, unlimited file size, powerful file merging, and other capabilities.
pfs: Write	125.00	73300-300	Software Publishing	IIe, IIc	Turns your computer into an electronic notepad. Working with <i>pfs: Report</i> and <i>psf: Graph</i> , form letters and graphics can be added to text.
Pie Writer	149.95 199.95	34925-400	Hayden Software	II, II+, IIe IIc	This is a word processing package with built-in training lessons, telecommunications, and mail merge.
Screenwriter II	129.95	69925-625	Sierra On-Line, Inc.	II, II+, IIe, IIc	True upper- and lowercase text, 70-column screen support, and uses the disk drive as an extension of memory, allowing documents of more than 50 pages.
Select 2.2	295.00	69100-100	Select Information Systems	IIe	A complete word processor that includes a spelling dictionary, mail merge, and a self-teaching tutorial program.
Sensible Speller IV	125.00	69200-500	Sensible Software, Inc.	II, II+	A spelling-verification program designed specifically for the Apple computer. Includes an 80,000-word dictionary and can proofread a 10-page document in less than two minutes.
Speller	39.95	34925-450	Hayden Software	II, II+, IIe, IIc	This program corrects spelling errors in any ASCII format text file, including <i>Pie Writer</i> and <i>Wordstar</i> .
Word Handler	199.00	70250-200	Silicon Valley Systems, Inc.	II, II+, IIc	Provides a 66-column display without an 80-column card. Simple one-keystroke commands make this program easy to use.
Word Juggler/Lexicheck	189.00	64285-100	Quark, Inc.	II, II+, IIe, IIc	This word processor and spelling checker package is a good program for extensive, serious writing. Includes replacement keycaps and a template for easier command access. Lexicheck is a 50,000-word dictionary.
Word Pro	34.95	39637-960	Interkom	II+, IIe, IIc	<i>Word Pro</i> is a simplified and inexpensive word processing program. No elaborate commands to learn.
Wordstar	495.00	53000-700	MicroPro International	II, II+, IIe	Complex and complete, this is a screen-oriented, integrated word processor. Requires Z80 card and C/PM for use on the Apple.
Write Away 5.0	175.00	53925-100	Midwest Software	II, II+, IIe, IIc	An integrated word processor/communications system.
Write Stuff	59.95	34301-100	Harper & Row Electronics	II+, IIe	This is a word processing package for both home and office. Lets you see the document exactly as it will be printed, without the expense of an 80-column card.

Database Management

Brock Keystroke Database and Report Generator	295.00	08825-500	Brock Software	Mac	This electronic file cabinet enables you to store, find, update, or print information with startling clarity.
Creative Filer	49.95	20600-071	Creative Software	II, II+, IIe, IIc	A database management system with unrestricted format. Change format after creation. Report writer included.
Data Factory 6.0	199.00	50500-100	Micro Lab	II+, IIe, IIc	Database management system with custom input/output, filter search, and calculator math.
Data Perfect	129.95	45100-100	LJK Enterprises	II, II+, IIe	Data processing package which is designed for business and personal applications. The package includes: Utilities Generator, Report Generator, Mailing Labels Generator, and a built-in calculator.
DB Master 4 Plus	350.00	76400-100	Stoneware, Inc.	II+, IIe, IIc	An information management system for business and professional use.

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Product	Price	ISBN	Publisher/ Vender	Systems	Description
DB Master Macintosh	195.00	76400-150	Stoneware, Inc.	Mac	A database management system designed to take advantage of the advanced capabilities of the Macintosh. Retrieve exactly the information you want using up to 20 search criteria.
DB Master Utility Pak #1	99.00	76400-200	Stoneware, Inc.	II+, IIe, IIc, Mac	An extension of the basic DB Master program.
Executive Connection	49.95	71800-025	SOF/SYS, Inc.	II+, IIe, IIc	This package lets your word processor merge with your database.
Filevision	195.00	81077-040	Telos Software	Mac	This database will store words, numbers, and pictures. You can store and work with information in pictures as well as numbers and text.
1st Base	195.00	24946-100	Desktop Software Corp.	Mac	Takes full advantage of the mouse and windows of the Macintosh. Design and create files, enter and edit data, sort on multiple fields, and produce reports.
General Manager 2.0	229.95	69925-210	Sierra On-Line, Inc.	II, II+, IIe, IIc	Designed for use at home, but more than powerful enough to be used at the office.
Hayden: Base	149.95	34925-520	Hayden Software	Mac	A relational database management and report generation system. It uses Macintosh's mouse, graphics capabilities, and menus to create a visual way to manage information.
Helix	395.00	57709-100	Odesta	Mac	Use <i>Helix</i> for database management, text processing, statistical analysis, report generation, or any other purpose.
The Incredible Jack of All Trades 1.3	179.00	09825-025	Business Solutions, Inc.	II, II+, IIe, IIc, Mac	An integrated package that combines word processing, calculations and database management.
MacLion	39.00	17525-500	Computer Software Design	Mac	A simple-to-use database manager. English commands make it easy to operate. Report generator included.
Main Street Filer	199.00	46040-100	Main Street Software	Mac	This is an information management system. Information can be merged with <i>Main Street Writer</i> or <i>Microsoft Word</i> for personalized mailings.
Megafile 1.01	195.00	48875-025	Megahaus Corp.	Mac	A file management program that works with <i>MegaMerge</i> and <i>MacWrite</i> . <i>Megafile</i> lets you create forms by painting them on the screen.
Microsoft File	195.00	53150-275	Microsoft	Mac	Record any information, any way you want it. Retrieve the information you need and present it in reports, the way you specify. Compatible with <i>Microsoft Word</i> .
pfs: File	125.00	73300-100	Software Publishing Corp.	II, IIe, IIc, Mac	Form-oriented information management and retrieval software. <i>pfs: File</i> works like a paper filing system, without the paper.
Query 2	99.95	36381-100	Hoyle and Hoyle Software	II+, IIe	A powerful, flexible database management system in which data is transferable between any personal computer.
Quick File II	100.00	03900-490	Apple Computer, Inc.	II+, IIe, IIc	An easy-to-use filing system for managing small to medium size collections of information. Design your own records for collecting information, select which categories of information you wish to review, and print tables, mailing labels, and index cards.
Viz-a-Merge	99.95	00312-200	Abacus Associates	II, II+, IIe	Allows the user to electronically cut and paste sections of spreadsheet reports together to make new reports.

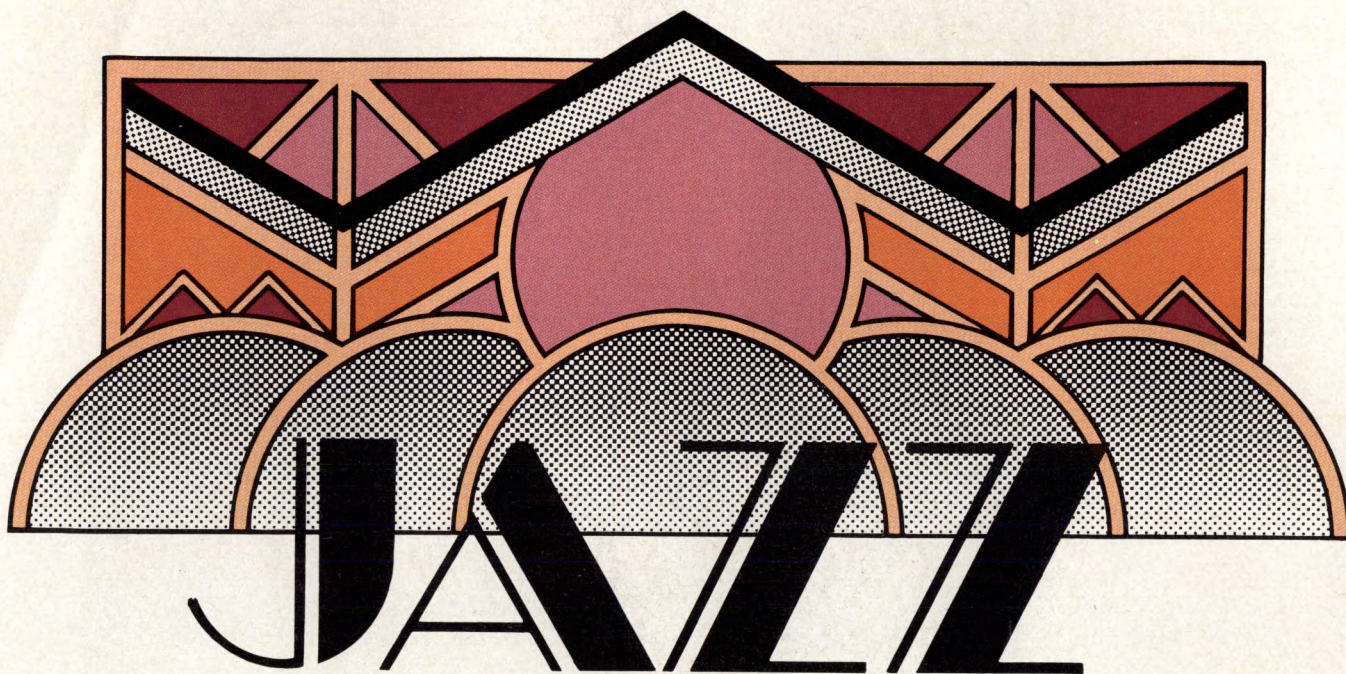
Integrated Office Management

AppleWorks	250.00	03900-207	Apple Computer, Inc.	IIe, IIc	An integrated package combining word processing, financial modeling and database management programs.
Habadex	199.95	33987-075	Haba Systems, Inc.	Mac	A desktop management system that lets you get at the information you need, when you need it, with just a click of the mouse.
Jane	295.00	05262-100	Arktronics Corp.	II, II+, IIe, IIc	This is an integrated package combining word processing, list management, and spreadsheet functions.
Jazz	595.00	45525-025	Lotus Development Corporation	Mac	Spreadsheet, graphics, word processing, communications, and database management capabilities make this program the complete business package. Nontechnical user-oriented software with the Macintosh's ease of operation. 512K Macintosh and two disk drives required.
Magic Office System	295.00	05425-450	Artsci	IIe, IIc	This program offers four office functions: word processing, spelling checker, spreadsheet, and business graphics.
Megadesk	125.00	48875-015	Megahaus Corp.	Mac	With <i>Megadesk</i> you get three new desktop accessories.
Open Access	695.00	73275-475	Software Products	Mac	A fully integrated package combining information manager, graphics, spreadsheet, word processing, communications, and time management.

Stock Market and Commodities

Dow Jones 2.0 Solution	175.00	03900-300	Apple Computer, Inc.	II, II+, IIe, IIc	<i>Dow Jones 2.0</i> includes the <i>Dow Jones News and Quotes Reporter</i> and the <i>Dow Jones Portfolio</i> .
Dow Jones Market Analyzer 1.0	349.00	26725-100	Dow Jones & Company, Inc.	II, II+, IIe	Performs technical analysis with historical stock data automatically retrieved from Dow Jones News/Retrieval.
Market Charter II	250.00	67250-210	RTR Software	II, II+, IIe	A general-purpose bar-charting program for individual stocks and commodities.
N-Squared Market Analyzer 4.5	295.00	55907-200	N-Squared Computing	II+, IIe	A system designed for the serious technical analyst interested in creating and comparing complex indicators and trends.
SOAP	250.00	33875-100	H & H Scientific	II, IIe	Communicates with Dow Jones News/Retrieval service, calculates and graphs profits or losses on three classes of options.

Product	Price	ISBN	Publisher/ Vender	Systems	Description
Stock Option Planner	100.00	79843-080	Taxcalc	II+, IIe, Mac	Designed to calculate the costs and results of a covered call, buying the stock, and selling the option.
Trader's Forecaster	250.00	77012-300	Summa Software	II, II+, IIe	Features the classical and proprietary tools of leading experts, plus high-resolution, interactive graphics.
Financial					
Bottomline	265.00	37131-200	Ilar Systems, Inc.	II, IIc, Mac	A well-documented financial decision support system consisting of three modules.
Dollars and Sense	100.00 119.95 149.95	55237-100	Monogram	II, II+, IIe IIc Mac	A personal and family financial management package.
Money Manager	39.95	82000-300	Timeworks, Inc.	II, II+, IIe, IIc	A home and small business budget and cash flow system.
Personal Accountant	49.95 89.95	72240-460	Softsync, Inc.	IIe, IIc Mac	A home and business bookkeeping system.
Senior Analyst II	225.00	03900-510	Apple Computer, Inc.	II, II+, IIe, IIc	A financial tool for managers and professionals who need to create and consolidate budgets, forecasts, and much more.
Accounting					
Back to Basics	195.00	60150-226	Peachtree Software, Inc.	II+, IIe, Mac	This is a double-entry, accrual accounting system consisting of three interactive packages for the small business.
Financial Partner	249.95	24800-100	Denver Software Co.	II, II+	This is a bookkeeping and accounting program for households or a very small business.
Hardisk Accounting Series 3.0	695.00	33475-100	Great Plains Software	IIe, Mac	A complete management/accounting software package.
Home Accountant Plus	150.00	19350-400	Arrays / Continental	II, IIe, IIc	A complete personal/business accounting package which maintains as many as 200 budget categories.
Peachpak 4	395.00	60150-653	Peachtree Software, Inc.	II, II+, IIe	<i>Peachpak 4</i> consists of three interactive business application packages for a small business with limited microcomputer capacity.
Superex: The Complete MacAccountant	700.00	77093-183	Superex Business Software	Mac	This package integrates all the features of a general ledger, accounts receivable, and accounts payable package.
Other Business Applications Software					
The Address Book	49.95	55850-060	The Muse Company	II, IIe, IIc	Stores names, addresses, telephone numbers, and prints mailing labels.
Apple II Business Graphics	175.00	03900-170	Apple Computer, Inc.	II, II+, IIe	Creates customized bar and pie charts, and performs curve fitting, trend analysis, and other statistical manipulations.
ASCII Express II: The Professional	129.95	75100-215	Roger Wagner Publishing	II, II+, IIe	A smart terminal package for talking to timesharing services and other computer systems.
ClickArt	49.95	79465-050	T/Maker Graphics	Mac	A collection of 100 professionally drawn images accessible through <i>MacWrite</i> or <i>MacPaint</i> .
Data Trans	133.50	00400-200	ABT Microcomputer	II+, IIe	A communications package which provides for macros and has the ability to transfer <i>VisiCalc</i> files.
DaVinci Landscapes	49.95	34925-004	Hayden Software	Mac	With <i>daVinci Landscapes</i> and your Macintosh, landscape design is as simple as the click of the mouse. Additional packages in the series include <i>Buildings</i> , <i>Interiors</i> , and <i>Commercial Interiors</i> .
Know Your Client 2.0	123.95	30462-050	Execuware, Inc.	II, IIe	An electronic client file that is extremely easy to use and is entirely menu-driven.
MacDraw	125.00	03900-410	Apple Computer, Inc.	Mac	A graphics shape editor, <i>MacDraw</i> allows designers and professionals to create and alter floor plans, technical illustrations, maps, graphs, charts, and more.
MacPaint	125.00	03900-413	Apple Computer, Inc.	Mac	The original graphics program for the Macintosh, <i>MacPaint</i> lets anyone create dazzling art on the screen.
Mac the Knife	39.00	54075-100	Miles Computing, Inc.	Mac	A collection of over 500 useful illustrations, borders, icons, and maps, all in convenient <i>MacPaint</i> files.
MacTerminal	99.00	03900-415	Apple Computer, Inc.	Mac	A terminal program which allows the Macintosh to communicate with commercial databases and electronic bulletin boards. Information can be stored and placed in other applications, such as <i>MacWrite</i> .
Magic Mailer 2.0	93.50	05425-300	Artsci	II, II+, IIe	Designed to produce customized letters and documents when used with your word processor.
Microsoft Chart	250.00	53150-265	Microsoft Corp.	Mac	Prepare presentation-quality charts from your own information. Compatible with <i>Multiplan</i> and <i>Microsoft Word</i> .
Tax Preparer	250.00	36350-300	HowardSoft	II, II+, IIe, IIc	This 1985 version prepares 1040 tax returns acceptable to the IRS. Creates Schedules A, B, C, D, E, F, G, R, SE, and W, as well as most forms. Updates available.
ThinkTank	145.00	45081-100	Living Videotext	II, IIe, Mac	Enter thoughts and ideas as they come to you, then organize them into outline form.
TK!Solver	299.00 249.00	72450-100	Software Arts	IIe Mac	Used to solve problems involving mathematical calculation and analysis. Simply enter the equation and the known variables.
VisiTrend/Plot	132.00	85350-825	VisiCorp	II, II+, IIe, IIc	A trend-analysis and graphing program. Enter data, change it, and project time lines and forecast trends.



Jazzing With The Macintosh

Vahé Guzelimian

Jazz, Lotus Development Corporation's new integrated software package for the Macintosh, promises to bring sophisticated tools to the office. Here's a first look at Jazz.

My jaw dropped when I first heard it. "Jazz targets the first-time micro user." Wait a second. How can Jazz—the offspring of *Symphony*, that maze of complex applications—be so easy to use that even a novice can virtually run a business with it? Eric Bedell, the marketing manager for Jazz, assured me that Lotus Development Corporation had indeed

created a product that was not only friendly, but downright lovable.

To test this claim, I played with Jazz on a 512K Macintosh. First I opened the worksheet and entered columns and rows of numbers. I chose a range of these numbers, opened the graphics window, then created an exploded pie chart. When I set an insertion point in a letter I had already entered on the word processor, the pie chart appeared in the middle of my text. Then I went back to my worksheet and changed a number. The pie charts in the graphics and word processor documents were automatically updated.

And I was able to do all this without looking at a manual. Thick, unwieldy manuals are

now history. The Macintosh and Jazz have joined forces to save a lot of trees.

The Macintosh-Jazz combination demonstrates a synchronous evolution. Apple succeeded in developing a computer that anyone can learn to use in about 30 minutes. Lotus brings this same concept to the world of business software. By adapting its program design to the Macintosh environment, Lotus has developed the ideal product—one that has incredible power, yet is very easy to use.

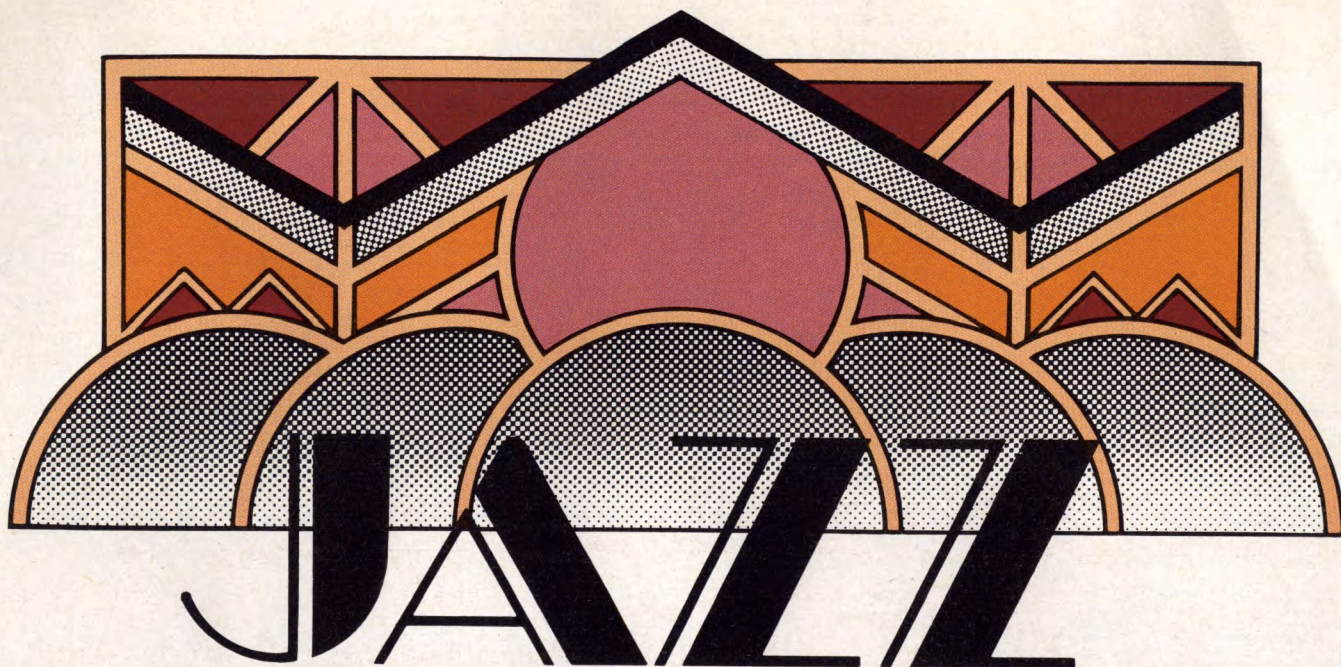
Lotus designers have gone out of their way to protect users from feature overload. Choices are available only when you want to find them. With just a little experience, you can learn how to use some of the more sophisticated features. And Jazz isn't stingy with features. It's probably the most sophisticated microcomputer product I've seen. Its ease of use is a phenomenal achievement; Jazz is certain to have many imitators.

The Soloists

Jazz is made up of six applications:

- Worksheet
- Graphics
- Word Processor
- Communications

Vahé Guzelimian, the author of Becoming a MacArtist (COMPUTE! Books), has written several articles dealing with the Macintosh for such publications as MacWorld and A+. He's presently working on an intermediate-user's book about Jazz.



- Database manager
- Forms, as a subset of the database

These six components reside in the memory of the 512K Macintosh, leaving about 256K free for documents. The program is designed to run very quickly. When you first tell *Jazz* to do something, it goes to the disk to get the algorithm for that task. However, it's not a disk-based system—it doesn't have to go to disk each time you want to perform an action. The next time you carry out the same task, it does it *without* accessing the

disk. If you move to another application and choose to do something else, a new algorithm is obtained from disk, and any unrequired algorithms are pushed out of memory. *Jazz* is smart.



The Jazz Worksheet

This is the heart of *Jazz*, the leader of the band, the product's muscle. The worksheet has 256 columns and 8192 rows. You can quickly move around this large worksheet by using the navigation or corner selection icons. You can even display your

worksheet in a variety of fonts and font sizes.

As you develop your worksheet, *Jazz* allows you to examine the attributes of cells with the *Show Attributes* option in the *Style* menu. It may tell you that a particular cell contains the formula for the average of a range of numbers, that it is a protected cell, and that the contents of the cell are right justified.

If you examine the *Range* and *Tools* menus, you'll see many of the features that make *Jazz* such a powerful spreadsheet. Menu options which end in three dots (ellipsis) yield a dialog box from which decisions must be made. Notice that these decisions are not presented until you need them. *Jazz* doesn't overwhelm.

The worksheet gives you the ability to build formulas in an easy and dynamic way. All you do is choose the one you need from a menu. The arguments of multiargument formulas are clearly shown—you'll never have to search through the handbook. If you choose the payment formula for installment payments of a loan, for instance, you can enter the formula PMT (Principle, Interest, Periods) into the cell of your choice. You can click to highlight one argument, such as Principle, and click the cell that represents that value. *Jazz* lets you point and click.

Figure 1: The Jazz Worksheet

File Edit Window Range Tools Font Style							
270							
D5							
Monthly Sales Forecast							
	A	B	C	D	E	F	G
1	Sales Forecast						
2	(in thousands)		Inflation=		5%		
3							
4		July	Aug	Sept	Total		
5	Sales	\$245	\$257	\$270	\$772		
6	COGS	86	129	135	\$350		
7	Profit	159	128	135	\$422		
8							
9	Expenses						
10	Auto	24	26	27	\$77		
11	Phone	12	13	14	\$39		
12	Wages	37	39	41	\$117		
13	Taxes	9	10	10	\$29		
14	Total	\$82	\$88	\$92	\$262		
15							
16	Net	\$77	\$40	\$43	\$160		
17							



Jazz Graphics

Jazz graphics lets you draw a variety of charts to represent data from various worksheets. Graphs that describe different ranges of numbers can be overlapped for an impressive effect.

There are six chart formats to choose from:

- Pie charts (shaded and exploded)
- Line graphs
- Bar graphs (stacked bar and overlapped bar)
- Area graphs
- Scatter plots
- Percent graphs

The line graphs have a stock market option. You can plot the high, low, open, and close prices of your securities. This will help you spot trends. Jazz can help you beat the bulls and the bears.

In other programs, when you make a graphics window smaller, part of the chart will be hidden from view by the edges of the window. If you resize a Jazz graphics window, the charts and graphs within that window can become proportionately larger or smaller, allowing you to see all the graphics in the window at once. Jazz gives you the option: You can freeze the size of the

charts in the window, or let it be resized in proportion to the size of the window.

You can add notes to your charts by drawing an annotation box and typing within it. This feature is particularly useful when you want a column of text beside a chart.



The Jazz Word Processor

The Jazz word processor has all the features of MacWrite, but it's not a sophisticated writing tool. It doesn't have the advanced features that you would expect in a stand-alone word processor.

The word processor's prime function is to serve as the host for data from the other Jazz applications. With data from the worksheet, you can create reports that include both text and tables of numbers. The word processor interacts with the database and forms to help you prepare letters with mail merge. With communications and a modem, the word processor helps you edit downloaded information and prepare data for transmission to other computers.

You can insert the date and time from Macintosh's internal clock into your word processing document, but you must be careful. These items are *hot* until frozen—in other words, each time the clock or date is updated by the Macintosh, it's also updated in your document.

As a host for all the other Jazz components, the word processor can mingle graphs, columns of numbers from the worksheet, even data from another computer (through Communications) and create a single report to be sent to a client list pulled from the database. This report remains hot—if any item from the worksheet or the database is changed, the word processor document changes it instantly.



Jazz Communications

If you've ever used a terminal program, you're familiar with screens crowded with an endless list of options. The baud rate, parity, number of bits, type of emulation, an almost endless list. If you have trouble making

Figure 2: Jazz Graphics

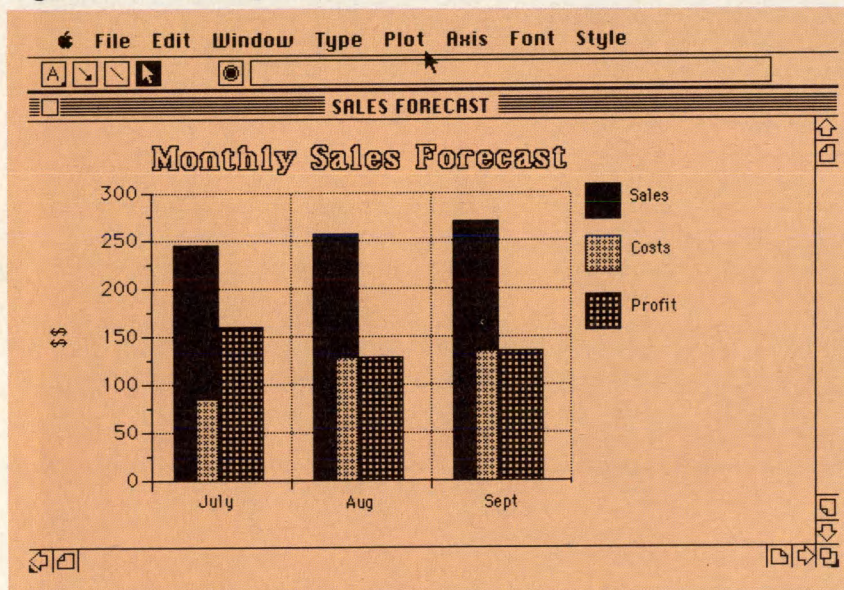
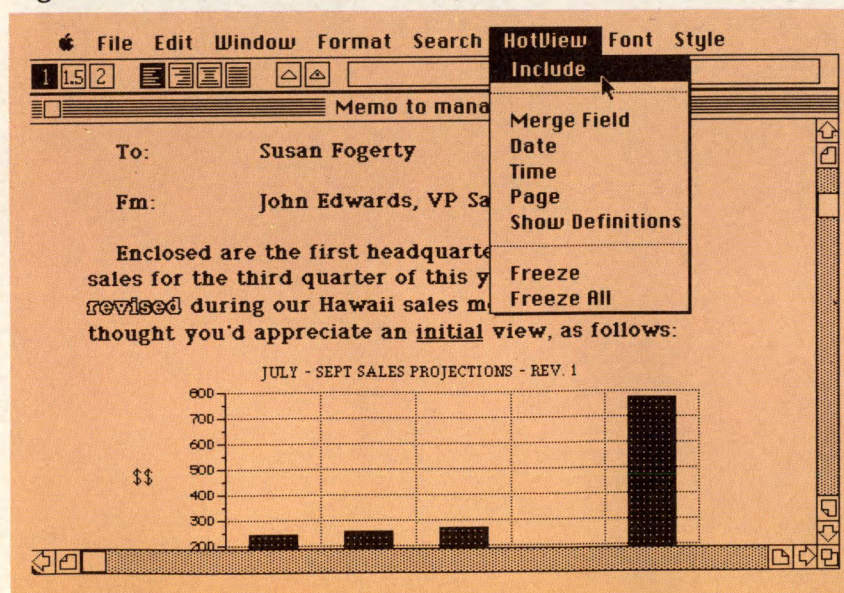
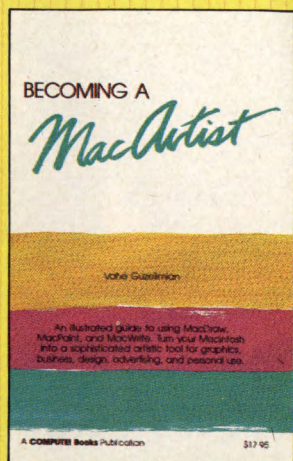


Figure 3: The Jazz Word Processor



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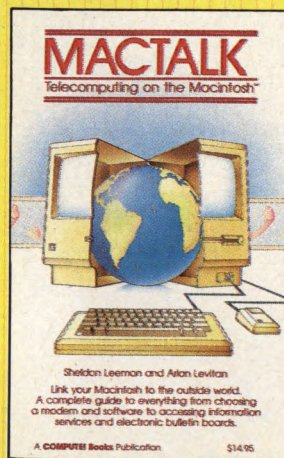
Becoming a MacArtist

Vahé Guzelimian

This illustrated guide to Macintosh graphics shows the power and flexibility of *MacDraw*, *MacPaint*, and *MacWrite*. The user will quickly be producing sophisticated advertisements, designs, layouts, reports, presentations, and business correspondence. Hundreds of illustrations detail just how to construct impressive graphics. Shortcuts, tips, and advanced features are also documented to make the Macintosh even more productive. Includes a gallery of professional artists' Macintosh creations.

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MacTalk: Telecomputing on the Macintosh

Sheldon Leemon and
Arlan Levitan

From selecting a modem to evaluating terminal software packages, this book details the ins and outs of telecomputing on your Macintosh. You can be communicating with other computers in a matter of minutes by following the quick-start checklist. You can even troubleshoot your system if there are problems. A variety of information services, such as CompuServe, The Source, Dow Jones, and others, are explained, making it easy to get started. And you'll see how to access popular bulletin boards. There's even a section that shows you how to transfer files to other Macintoshes or other computer systems.

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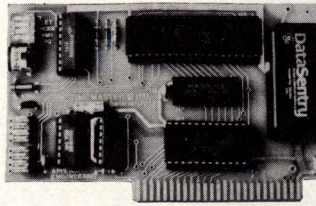
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	PRO-DOS COMPATIBLE	INCLUDES DOS DATER	MILLISECOND TIME	YEAR DATA	LARGEST SAMPLE SOFTWARE	REMOTE SET PORT	BSR PORT	EMULATES ALL OTHER CLOCKS
H.O.	YES	YES	YES	YES	YES	YES	YES	YES
BRAND A	NO	NO	YES	NO	NO	NO	NO	NO
BRAND C	NO	NO	NO	NO	NO	NO	NO	NO
BRAND M	NO	NO	NO	NO	NO	NO	NO	NO
BRAND P	YES	YES	NO	YES	NO	NO	NO	NO
BRAND S	NO	NO	NO	YES	NO	NO	NO	NO
BRAND T	YES	NO	NO	NO	NO	NO	YES	NO

Full emulation of all other clocks. Yes, we emulate Brand A, Brand T, Brand P, Brand C, Brand S and Brand M too. It's easy for the H.O. to emulate other clocks, we just drop off features. That's why the H.O. can emulate others, but none of the others emulate us. The Timemaster II H.O. will automatically emulate the correct clock card for the software you're using. You can also give the H.O. a simple command to tell it which clock to emulate. This is great for writing programs for those poor unfortunates who bought some other clock card.

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- Low power consumption through the use of CMOS devices.
- All connections are made with standard video connectors.
- Both upper and lower characters are standard.
- All new design (using a new Microprocessor based C.R.T. controller) for a beautiful razor sharp display.
- The VIEWMASTER incorporates all the features of all other 80 column cards, plus many new improvements.

	PRICE	BUILT-IN SOFTWARE	SHIFT KEY SUPPORT	LOW POWER DESIGN	80 COLUMN HOME	7X9 DOT MATRIX	LIGHT PEN INPUTS	40 COLUMN OVERRIDE	INVERSE CHARACTERS
VIEWMASTER	139	YES	YES	YES	YES	YES	YES	YES	YES
SUPRTERM	MORE	NO	YES	NO	NO	NO	NO	YES	YES
WIZARD 80	MORE	NO	NO	NO	NO	YES	NO	YES	YES
VISION 80	MORE	YES	YES	NO	NO	YES	NO	NO	NO
OMNIVISION	MORE	NO	YES	NO	NO	NO	NO	YES	YES
VIEWMAX 80	MORE	YES	YES	NO	NO	NO	YES	NO	YES
SMARTER	MORE	YES	YES	YES	NO	YES	YES	NO	YES
VIDEX	MORE	NO	YES	YES	NO	YES	YES	NO	YES

The VIEWMASTER 80 works with all 80 column applications including CP/M, Pascal, WordStar, Format II, Easywriter, Apple Writer II, VisiCalc, and all others. The VIEWMASTER 80 is THE MOST compatible 80 column card you can buy at ANY price!

PRICE \$139.00

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Now Includes New 4.0™ Software

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The simple fact is that RAMWORKS is compatible with more off-the-shelf software than any other RAM card. RAMWORKS is 100% compatible with ALL software written for the Apple 80 column and extended 80 column card. Additionally, RAMWORKS can emulate other RAM cards so software written for other cards will run without modification. Software written for RAMWORKS will not work on other cards. We can emulate others, but others can't emulate us.

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RAMWORKS just plugs in and clear instructions show how to plug more memory chips into RAMWORKS as your needs increase.

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Popularity translates into great software support because software companies can't support all RAM cards, they can only support the ones their customers are likely to own.

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For only \$129 an RGB option can be added to RAMWORKS to give you double high resolution color graphics and sharp 80 column text on any Apple compatible RGB monitor. The RGB option does not take up another slot, but rather it plugs into RAMWORKS. You can order the RGB option with your RAMWORKS or add it on at a later date.

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Let's say you bought some other RAM card (and that's a mistake) and your RAM card is not being recognized by Appleworks, Advanced VisiCalc, FlashCalc or other programs and you want RAMWORKS. No problem. The memory chips on the card that you have now, which is where most of the money is, can be unplugged and then plugged into the expansion sockets on RAMWORKS.

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decisions, this can make you a little anxious. And this selection process takes time. *Jazz* avoids overwhelming the first-time user through the use of dynamic dialog boxes. Options dependent on other options are not displayed until they're required. *Jazz's* communications uses this idea beautifully. A modest number of decisions gets you on-line.

Jazz communications offers asynchronous communications with emulation of the DEC VT52 and VT100 terminals. A keypad, like the ones used by these terminals, is always in view at the top of the communications window. You can communicate with another computer to accept *Symphony*, *Multiplan*, or *Lotus 1-2-3* data. Data received in this way can then be converted to the *Jazz* format by choosing *Convert . . .* from the Apple menu.

With communications an integral part of *Jazz*, it's easy to access powerful mainframe computers and their vast amounts of information. You can call up Dow Jones News/Retrieval and get historical stock market quotations for the stocks that you're following. These quotes can be entered into the worksheet and then analyzed. Your chart which plots the open, close, high, and low prices of your securities is updated in every document in which it resides. Now you can create a report that includes this chart and send it to an associate's computer via *Jazz* communications. *Jazz* keeps you in rhythm.



The Jazz Database

The first step in using the *Jazz* database is to define the fields for the records you'll create. You can enter your customer list, for example, with first name, last name, and address. This is a flat field, tabular database. It won't give you the powerful features of sophisticated stand-alone database programs, but it's adequate for most users. You can define an unlimited number of fields and sort based on any of them. Calculations can be carried out within the database.

Figure 4: *Jazz* Communications

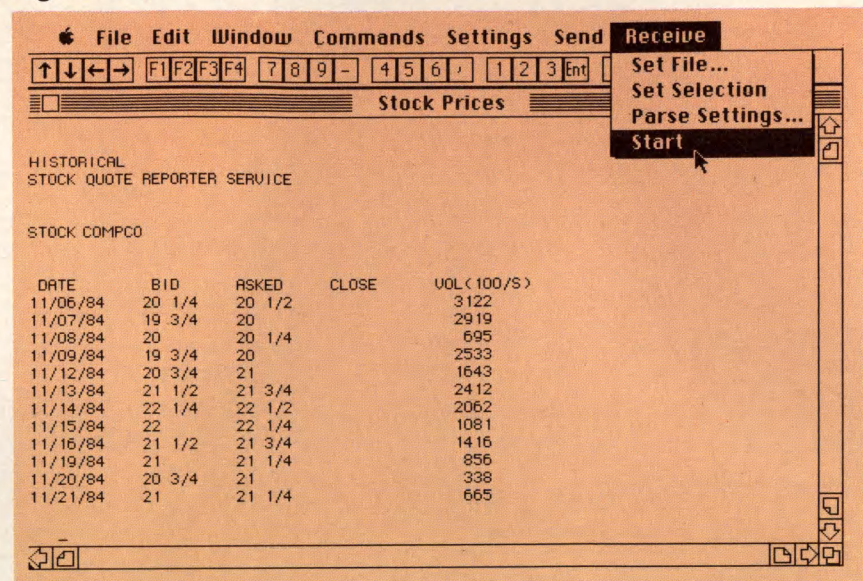


Figure 5: The *Jazz* Database With Forms Open

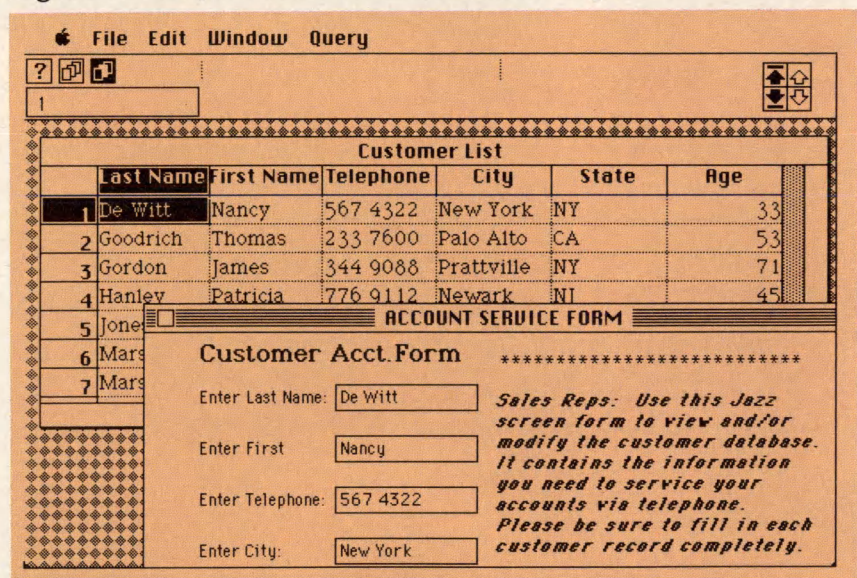
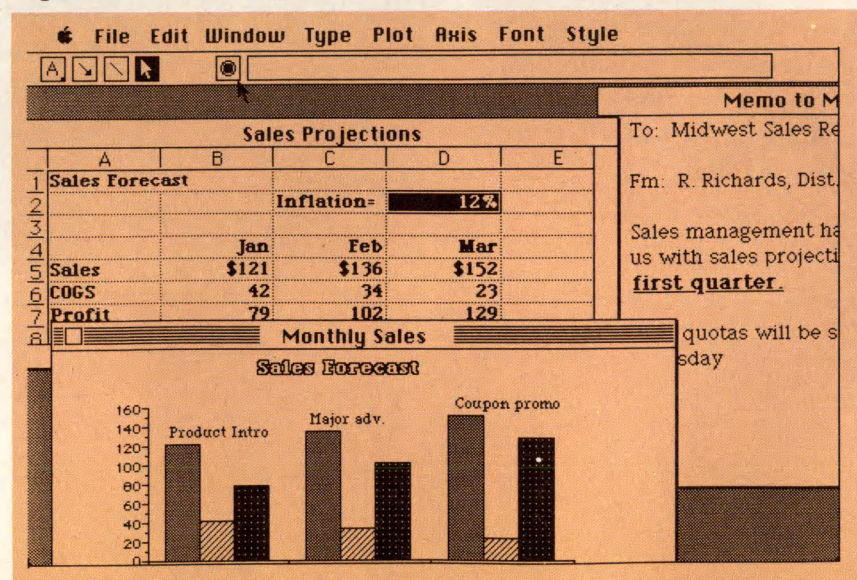


Figure 6: Several Open Windows





Jazz Forms

Jazz forms gives the database its true power and flexibility. When you enter the forms application, a default form is provided for the fields available from your database document. This is a great convenience for first-time computer users who want to use standard forms. You can modify this form by moving fields from place to place and altering the size and the font style for each field. You can change the prompts, enlarge fields, and even add annotations.

Once you have a form set up, you can cycle from record to record. You can also choose items from the *Query* menu to organize your data.

You can use Jazz forms to print out reports, mailing labels, even addresses on business envelopes, corporate labels, or small labels. Jazz forms provides harmonious output.

Unlimited Windows

Jazz lets you open as many documents as you wish. You can have a worksheet, a word processing document, and a graphics document open at the same time. You can size these windows any way you want with the familiar Macintosh conventions.

But how can you keep track of all these windows? What if one is hidden behind the other? How do you track it down? Jazz helps you manage your windows. The *Window* menu is available at all times. It's a dynamic menu that changes as you work. Each time you create a document, the name of the document appears in the *Window* menu. To get a document to come to the surface, just select it from the menu.

If you're using two worksheet documents, they'll appear in the *Window* menu as Worksheet 1 and Worksheet 2 until you save them under different names. If you want to work with Worksheet 1 only, choose *Zoom Up* from the *Window* menu, and the Worksheet 1 window grows to fill the entire screen. If you pull

down the *Window* menu now, you'll see Worksheet 1 as the first entry. The other open documents are listed in the order in which they're stacked. If you change the stacking order, the *Window* menu changes too. Jazz is smart and easy.

The Jazz Sextet: Four Levels Of Integration

Jazz music is formed as a tapestry of solo performances interspersed with exchanges and dialogs between the various players. In a similar way, Lotus's Jazz offers the user ways of sharing information between the five components. There are four ways that data can be shared:

External Integration: Jazz lets you cut information from any other Macintosh application program and paste it into a Jazz application via the Clipboard.

Static Integration: Like other Macintosh programs, Jazz allows you to cut and paste via the Clipboard to move numbers, text, or pictures from one Jazz application to another.

Intuitive Integration: In some situations, Jazz provides automatic, intuitive sharing of information between applications. For example, a range of numbers may be taken from a worksheet and put into graphics to yield a chart. Information from the database is pulled into forms to create a report. Unless you choose otherwise, these intuitive links are always active—if you make a change in the worksheet or the database, the graph and the report will be updated to reflect that change.

Dynamic Integration: This form of integration allows you to use the word processor as a host environment for information from any other Jazz component, even if the exchange is not intuitive. Lotus calls this type of integration *HotView*. You can take a chart from graphics, a range of numbers from a worksheet, and the date from the internal clock and put them into a word processing document. You can easily do mail merge from your database in this

HotView mode. The integrated items remain hot unless you freeze them: If you make changes in any of the elements, the word processing file changes accordingly. Jazz is hot.

Music To Your Ears

Lotus has included some nice touches that make Jazz a joy to work with. For example, it uses a two-level warning system. If you try to carry out an inappropriate action, you hear a beep. If you do it again, you see a dialog box that lets you know what you're doing wrong. This is convenient for experienced users who understand what they did wrong at the beep. They don't have to see the same dialog box each time and click to put it away.

Jazz's ability to update extends even to documents that are not open or that are on a disk that isn't in the drive. When you update a worksheet, for instance, the changes are recorded in all the open documents that use data from that part of the worksheet. Any unopened documents are also opened and changed. If a document is on a different disk, you'll be asked to insert it so Jazz can update it with the new values.

If you want to locate a Jazz document from a disk, just choose *Open* from the *File* menu. You'll see the six applications icons. When you choose one, you'll see the names of all the documents on that disk that are of that type. If you want to examine a directory of all Jazz documents regardless of type, choose *Jazz/All Types*. This gives you a disk directory listing of all Jazz documents to help you find the one you're looking for.

Masterpiece

Jazz will almost certainly boost the Macintosh's credibility as a business productivity tool. It is Lotus's most polished, intelligently designed product. Jazz will bring the power of the Macintosh to the Fortune 500 companies, as well as to small businesses unfamiliar with microcomputers.

IS ANYONE OUT THERE?

Getting Ready For Telecommunications

Arlan Levitan

Telecommunications, one of the hottest topics in personal computing, allows you to "talk" to sophisticated databases, bulletin boards, and even other users. All you need is a modem and the proper software. But where do you begin? What should you look for? Arlan Levitan, coauthor of MacTalk: Telecomputing on the Macintosh, guides you through the buyer's maze.

There's more to computing than making rows and columns in spreadsheets, pounding on the keys in marathon word-processing sessions, or playing countless rounds of arcade games. It's called telecomputing.

Telecomputing can open up new worlds of information to anyone with an Apple computer, a *modem*, and the right *terminal software*. There are people and computers, thousands of them, out there, and reaching them is only a matter of dialing a number. Computers ranging in size from huge mainframes at commercial databases like The Source or CompuServe to micros no larger than your own Apple are easily accessible. The information they can provide is staggering. You can view the latest stock quotations, bank electronically, even converse with other Apple owners.

Though the computer on the other end may be thousands of miles away, you can receive and transmit information as if it were right in your home.

But you need the right equipment and the right software. What should you look for?

Modems

A modem (pronounced MOE-DEM) is able to change numeric data within computers into sound (MODulation) and change sound back into data (DE-Modulation). They transform computer data so it can be sent over normal telephone lines.

Buying a modem can be a confusing experience. There are dozens of brands available, and usually several models of each brand. Fortunately, the fundamental issues in choosing a modem are relatively few. Compatibility with two things—your computer and the terminal software you intend to use—are of primary importance. A modem that won't "talk" to your

["Hi, we're from Europe. Where's the gold?"]

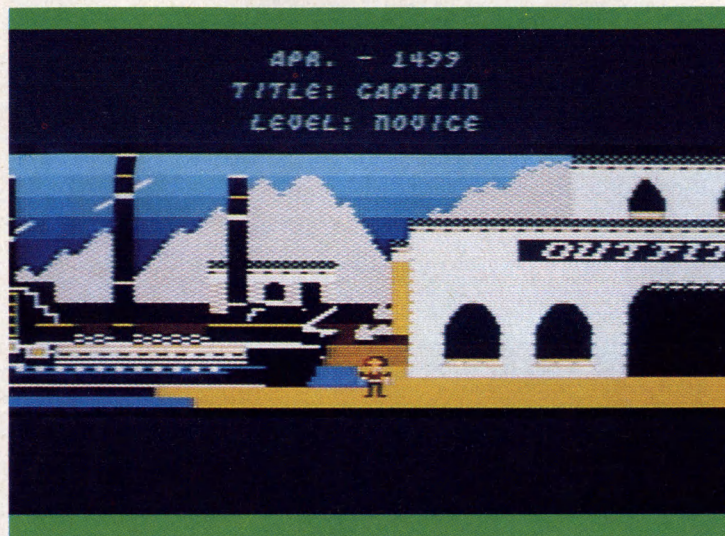
A SECOND CHANCE to GET the NEW WORLD RIGHT.

IF COLUMBUS HAD LANDED IN NEW JERSEY; if Cortez had been nicer to Montezuma; if Pizarro had been a more generous soul, would the world today be any different?

If you've ever wondered about things like that, you'll like *Seven Cities of Gold* very much indeed.

It's a kind of adventure. An unusually rich and technically impressive one with new continents to explore, natives to encounter, resources to manage and trade routes to establish. But beyond all the neat stuff *Seven Cities* throws up on the screen, there's something else happening here.

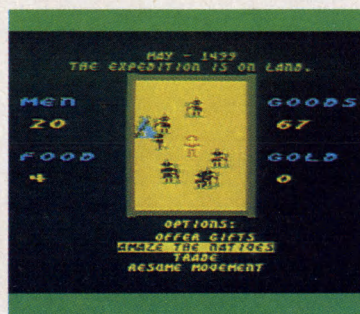
It feels quite odd to look at the map and see nothing. Of course you have to explore the more than 2800 screen new world in order to map it. But the way the natives act, the way you get older,



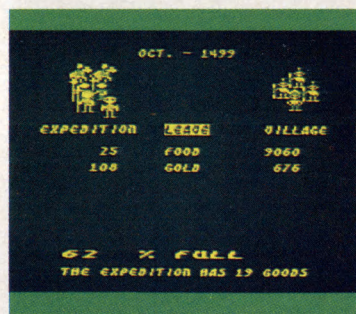
This is Europe, in scrolling 3-D graphics. You outfit, visit the Crown, launch your ships, and if you're cut out for this, you return later to tell all sorts of wild stories about what it's like over there.



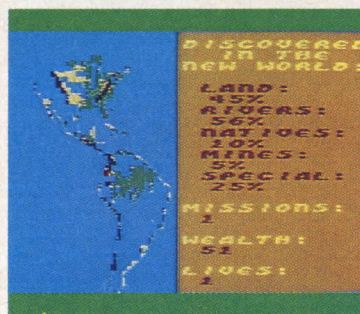
There are over 2800 screens to explore in the new world. As you scroll through them, seasons change.



Animated natives surround you. They have no reason to trust you. The drum beat quickens.



Trading with the Aztecs is tricky. You could wind up with enough gold to build an empire. Or as soup.



Home again you view your maps, pat yourself on the back, and consider your place in history.

the way seasons change and your men behave, and the way your reputation precedes you gives you a sort of feeling that's unexpected in computer games. It's deeper. Maybe a little disquieting. It plays as much in your head as it does inside your computer.

Seven Cities does all this with the real world or, better still (since the "new" world really isn't any more), it will construct any number of completely detailed hemispheres for you to try your hand with.

Designed by Ozark Softscape (the people who made *M.U.L.E.*, *Infoworld's* "Strategy Game of 1983"), *Seven Cities* is about as near a recreation of history as has ever been accomplished, with or without a computer.

Find it. Stomp around in it. See if you can't do a better job than all the celebrated figures who got us into the mess we have to deal with today.

SEVEN CITIES of GOLD™

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computer or your terminal software is of little use.

Perhaps that's why the most prudent purchase for many Apple owners will be one of the modems marketed by Apple itself. The price includes the proper cable to connect computer and modem, and the instruction booklet includes chapters which deal specifically with telecommunications via the Apple. The Apple modems represent a fair value for your dollar. Their pricing places them squarely in the middle of the range for units offering similar features.

Non-Apple modems generally don't come with connecting cables which can cost from \$20 to \$40.

Internal/External

While most modems are stand-alone pieces of equipment that come in their own case, owners of Apple II+ and IIe systems may opt to purchase an internal modem card that plugs into one of the expansion slots on the Apple motherboard. Internal modems do save valuable desk space, but are usually designed to work with only one specific computer. Most external modems work with almost any computer.

Speed + Features = Price

The major factors in the price of a modem are the maximum speed at which it can send and receive data, and the number and variety of other features it includes.

A low-speed modem's top speed is 300 bits per second (bps). Such modems range in price from \$50 to \$280, depending on what other features are included. Modems able to handle data transmissions at both 300 and 1200 bps range from \$300 to \$700. The top end of modem lines are 2400 bps devices, which are also capable of 1200 and 300 bps transmission. They command a premium price (\$800-\$1,500).

Are medium- or high-speed

units (often with the same features as equivalent 300 bps modems) worth the money? It depends. You have to balance cost against the lesser time required to receive and/or transmit a given amount of data. Most commercial information services, like CompuServe, The Source, or Dow Jones News/Retrieval, include a surcharge if you use any speed other than 300 bps. Comparing the surcharge against the decreased time you'll spend on the service can give you an idea of possible savings.

How much time you'll save with a higher speed modem depends on your telecomputing style. You must also take the indecision factor, or "think time" into account. A remote system waits the same amount of time for you to figure out what you want to do, whether you're connected at 2400, 1200, or 300 bps.

Features To Look For

Many modems can automatically dial telephone numbers for you. A modem with **autodial** can eliminate manually placing a call to a database system. A few keystrokes or a couple of clicks of the mouse, if the software you're using supports autodial, places the call.

A flexible autodial system supports both pulse (rotary type) and tone dialing. This is a must if your local telephone exchange doesn't react to tone dialing, and you want to use alternative long-distance services like MCI and Sprint.

Autoanswer allows your computer to use telecommunications software which requires your modem to handle other computers calling your system. The most common applications of a modem with autoanswer are Bulletin Board Systems (BBSs) and private electronic mail systems. Almost all the remote systems you'll call are equipped with autoanswer modems.

Some sort of **call status monitor** is often helpful. Many modems have internal speakers,

which let you listen to what's happening on the phone line while it's autodialing. That makes it easy to tell if the system is busy or if the line is noisy. After connecting, the speaker shuts off.

Modems without built-in speakers usually report the call's progress with messages on the screen. Some can also detect busy signals or if the call is answered by something other than a computer.

Consider the quality of the **documentation** that comes with a modem and the length of the manufacturer's warranty. Modems are typically very reliable and two-year or longer warranties are fairly common.

The bottom line? Stick with an autodial modem supported by the terminal software you wish to use. Let your pocketbook and intended use dictate the top speed of the modem.

Other Hardware

If you have an Apple II+ or IIe, you'll need a serial interface board, such as Apple's Super Serial card. While there are several excellent brands of serial cards available from third-party manufacturers, the Apple Serial Card is commonly available at significant savings when purchased as a package with an Apple 300 or 1200 modem.

A Warning for Apple IIc Owners.

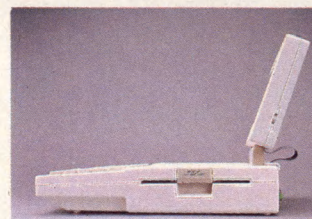
Apple IIc computers manufactured before January 1, 1985, may have some difficulties in using modems other than the Apple 1200 at transmission speeds of 1200 bps or higher. A design change was made in the IIc at the beginning of the year to correct the problem. If you have an older IIc, and you're having problems using the computer with another manufacturer's modem, you can have the problem fixed by bringing the IIc and a receipt for your non-Apple modem to an authorized Apple repair facility. There's no charge for this service. Check with your local Apple dealer for further details.

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Terminal Software

The modem translates data from numeric information to sound, and back again. But a modem by itself does nothing. You need a program, often called a *terminal software program*, to tell your computer *how* to talk to other computers.

Picking a terminal program for your Apple can be as difficult and personal a decision as purchasing a new car. Aside from some elements common to all communications programs, each has its own flavor or feel. More important, terminal programs range widely in both features and cost.

Some full-featured terminal software for Apple computers present a list of functions for you to choose from. Other, command-driven programs are faster, but they require that you memorize short command names or key combinations.

Though menu-oriented programs are easier to learn, menus can become rather tedious once you're experienced. If speed of use becomes important, a program that includes shorthand keyboard commands as well as menus is a good bet. Occasional modem users will probably be better off sticking with menus, however.

Terminal Memories

A feature you should look for in terminal software is an ability to remember telephone numbers. Terminal programs often have special support built-in for remembering the phone numbers of favorite information services and bulletin boards.

Telephone numbers aren't the only thing you might want a terminal program to remember. Communications settings, such as transmission speed and error-detection schemes, may vary from system to system. The ability to set up and then store both the telephone number and the communications parameters of a specific service eliminates the need to check the settings every time you make a call.

Automatic

If your Apple is equipped with an autodial modem (such as Apple's own 300 or 1200), the computer can automatically pick up the phone and dial. There's one catch. Your terminal program must be able to use **autodial** before your modem can do anything.

Since bulletin board systems only accommodate one user at a time, trying to get through to a popular BBS can be frustrating. It's not unusual to spend a long time trying to get through. In such situations, a terminal program that automatically redials busy numbers can be a godsend. Look for **auto redial** if you're planning to call large bulletin boards.

Macros

Macro keys are another thing to consider. They can be a telecomputerist's best friend. You'll find that there are certain strings of characters that you'll use almost every time. For example, to read the Apple-related notices on the POST feature of The Source, you would type *post read keyword apple*. Setting things so that selected strings of characters are associated with each system can save you a good deal of typing. When a special combination of keys is hit, the stored string *post read keyword mac* (or anything else you may choose) can be sent. Why be concerned with how much time it takes? In telecomputing, time really *is* money, either in long-distance phone bills or connect-time charges.

File Transfer

One of the most useful things a terminal program can offer is the ability to transfer textual information or actual computer programs between systems.

To help make this transfer process as painless as possible, many bulletin board systems support an error-checking protocol called XModem. If you're interested in downloading programs from BBSs, make sure

your Apple terminal program supports XModem file transfers.

Also, no matter how simple a program is, clear and concise instructions on how to use it are a must. Muddled, incomplete, or poorly organized documentation can make an excellent program impossible to operate. As with any software, check the documentation before you buy.

A Caveat for Apple IIe and IIc Owners.

Due to some quirks in the design of the 80-column display circuitry of the Apple IIc and the Apple Eighty Column Card for the IIe, some terminal programs may lose the first few characters of a line of text when in 80-column display mode. This seems to happen only at transmission speeds of 1200 bps or higher. Check any intended terminal software purchase for proper operation before taking it home.

Select a modem and terminal program combination that is flexible enough to adjust to all of your telecomputing needs. The easiest way to be sure that your intended purchases satisfy you is to find a cooperative dealer who is willing to take the time to demonstrate various combinations of software and hardware, and who will turn you loose on a local bulletin board system for an hour or so. Local Apple user groups can be a valuable resource for the telecomputing novice. Attend a user group meeting and strike up a conversation with fellow users who already own modems. With the support of a good dealer and local enthusiasts, you'll quickly be talking with the world.

Alan Levitan

Contact me electronically via:

Source ID: TCT987

CompuServe: 70675,463

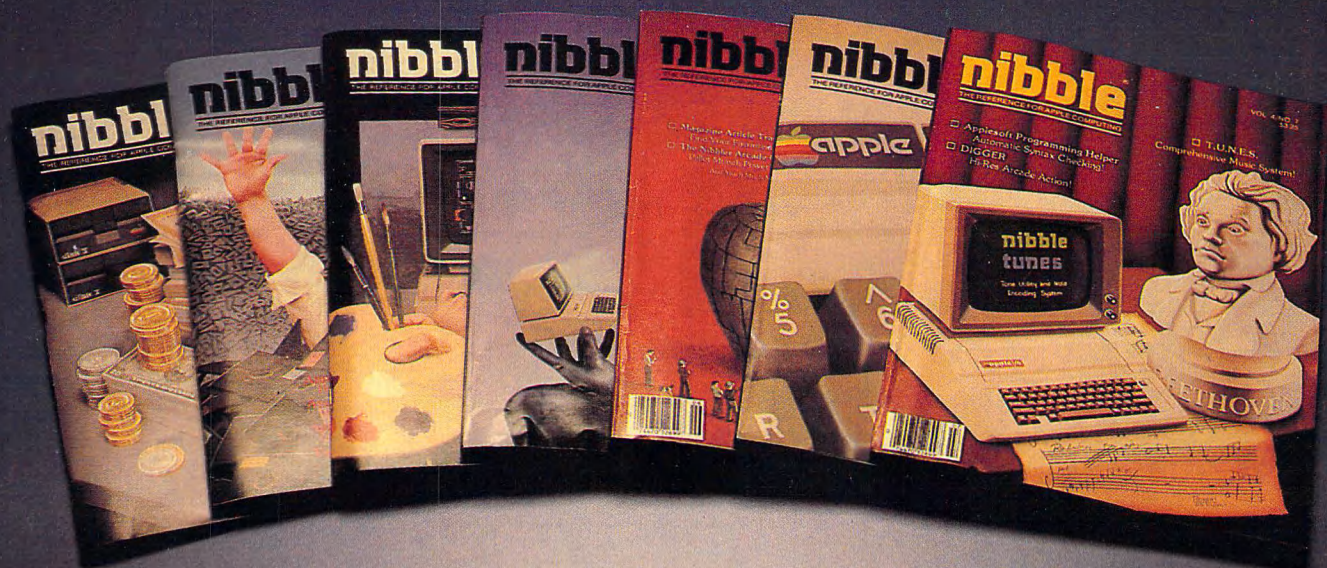
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A Buyer-Beware Guide

Matthew Lesko

Commercial databases aren't the only places you can go for information. Matthew Lesko, a database professional, describes the questions you need to ask before going online, and presents some attractive alternatives.

Databases, those huge collections of electronic information, are here to stay. As prices drop and they become easier to use, more and more people turn to databases for their informational needs.

The power of online databases lies in their ability to provide vast amounts of information conveniently on your computer screen. Just as important, online communication allows like-minded people to exchange information quickly. Problem-solving becomes more efficient as information is exchanged at a faster and faster pace. If you're a veterinarian in California and encounter a disease you can't diagnose, for example, you can post your problem on a veterinarians electronic bulletin board and within

hours see comments on treatments and results from vets across the country. This aspect of electronic communication offers an even greater potential to you, and our society, than simply sifting through large amounts of information.

But it's not *all* good news. More information can cause initial confusion: do you need it, how do you obtain it, how much should you pay for it? In many ways, databases have become a buyer-beware market. What one database offers for a considerable sum another is giving away free. Commercial databases spend a lot of money telling potential users about services, and why they are necessary for modern life. In contrast, other organizations spend very little money advertising because they've created their databases for other reasons, perhaps as a public relations tool. Though this is true with most information, the problem is magnified with databases.

The Database E♦X♦P♦L♦O♦S

Why do some database users pay commercial services up to \$144 per hour to read the latest stock quotes when they can get much the same information from a free database offered by a New York discount brokerage firm? Why do others pay up to \$90 per hour to get weather information from a commercial database when they can get virtually the same data, for free, from a database offered by the U.S. government? Usually because they don't know of such alternatives.

Much of the problem comes from the explosive nature of databases. It's hard even to know *where* to shop for a service. In 1979 there were approximately 500 online databases available. By 1985 this number has grown to somewhere between 2500 and 3500. If you're looking for an online encyclopedia, for instance, you can choose from six databases, ranging in price from \$6 to \$55 per hour. If you're looking for a database which lists available Apple software, you have an option of tapping into one of eight commercial services, at prices up to \$160 per hour. It's almost impossible to devote the time necessary to identify all your options. What you can do is one or both of the following:

- Review one or more of the more popular database directories. There are several good ones available, ranging from my own *Computer Data and Database Source Book* (Avon Books) to *Inc Magazine's Databasics* (MIW Associates). Others include *Omni On-Line Database Directory* (Macmillan), *Directory of On-Line Databases* (Cuadra Associates), and *Readable Databases* (American Library Association).

- Talk with someone knowledgeable about reference material in your area of interest. If you're looking for a stock market database, for instance, talk to a librarian at a major stock brokerage company. Ask a reference librarian at a university library if you're searching for an online encyclopedia. If such resources aren't available, consult a reference librarian at your local public library.

Your shopping becomes even more complicated once you've identified the relevant databases. To compare prices, you have to consider price structures, which may or may not include such things as initiation fees, monthly minimums, evening discounts, or record charges. (One method to compare apples and oranges in this market is to ask for the cost of an average search.)

But do you even need to go online? Why spend \$20 per hour to read the news on your screen when you can get more than you'll ever need in your morning paper for 25 cents? Doesn't the paper provide enough news, fast enough?

Many databases are simply electronic forms of information that are available elsewhere. Evaluate how much this convenience is worth to you, especially for expensive databases. Many of the indexes to current literature accessible through databases are also available at your local library. Is the money spent on the database equal to the cost of the time it would take you to go to the library? Perhaps the database is available from a government agency on an offline mode versus an online mode offered by a commercial database. The U.S.

Exports database on the Dialog system is one example. They charge \$45 per hour to use the system, *or* you can call or write the U.S. Department of Commerce and they'll run the same database, at no charge, and send you the printout. All it costs is the price of a phone call or letter.

Sometimes going online can create more information problems than it solves. The computer and databases are wonderful tools for manipulating large amounts of information. But if you're not careful in your searches through databases, you can quickly suffer from information overload. On any given topic there are usually a half-dozen databases available, and any one of them is likely to reference 200-300 articles, books, or journals. You don't have time to read one-tenth of that. My theory in handling such a problem is that almost anyone can find a free expert (who has read most of those articles and can tell you the best one to read—or simply send the information) in seven phone calls. Test this by starting with the National Referral Center at the Library of Congress in Washington, D.C. Its staff of experts will identify an organization that will give you free information on any subject. Best of all, their service costs nothing.

This isn't to say that you should avoid databases. On the contrary, they're one of the best ways to gather information. But you should realize that there are problems associated with using them. If you're not aware of this, you can easily have unrealistic expectations which will never be attained.

By now you have your modem, and have probably received some information from one of the commercial database services. You know what kinds of information you're likely to access. But there's more to databases and telecommunications than the commercial

I.O.N

services. Here are several free databases and information exchanges that can save you money as you spend time online.

Free database offers bibliographies of computer magazines.

The Central Washington RBBS (Remote Bulletin Board System) offers a unique source of bibliographies for many of the popular personal computer magazines, including *PC World*, *PC Week*, *Infoworld*, and *Personal Computing*. The system also offers a number of additional features including downloading of free communications software. Available between 6:00 p.m. and 7:00 p.m. (PST) on weekdays and 24 hours on weekends and holidays. The system shows you how to get a free password. Use your modem to call (509) 697-7298 or contact:

Patrick E. O'Farrell
The Central Washington
RBBS System
P.O. Box 538
Sehal, WA 98942
(509) 697-7296

Free database on insurance and risk management.

The Risk and Insurance Management Society in San Francisco and Atlanta operates a free bulletin board system that will keep you up-to-date in the industry. The system also provides information on job openings, industry hardware and software developments, and insurance data that can be formatted for popular software like *Lotus 1-2-3*, *dBase II*, and *dBase III*. (At the time of this writing, a third system was getting ready to go online in Chicago. Its number can be found on either of the boards currently operating.) Use your modem to call (415) 793-9983 in San Francisco or (404) 231-2271 in Atlanta, or contact:

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Free online directory helps find software.

This free software search service offers help in the following categories: amusement/games, education, graphics, programming aids, data communications, general business, home and personal, and specific business markets. Each category contains further subject headings. Entries provide a description of the program as well as price and other purchasing information. Use your modem to call (305) 845-6466, or contact:

Searchmart Corporation's
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Free hook-up to economic data and hi-tech stock information.

The primary mission of the Computer and Economics Bulletin Board is to offer free and low-cost economic data to personal computer users in either ASCII or *Lotus 1-2-3* formats. The files available include such topics as: M1 Money Supply, Euro Dollar 90-Day Interbank Loan Rate, the Federal Reserve Open Market Account Net

Change, and Foreign Holdings of Marketable Treasury Bonds and Notes. Other features include reviews of hardware and software products, economic news and commentary, computer marketing analysis, and hi-tech stock buy and sell recommendations. Use your modem to call (201) 398-6724 or contact:

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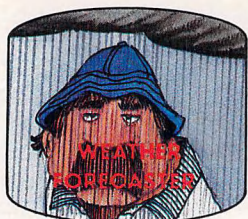
Gas Net, a bulletin board provided by the National Aeronautics and Space Administration (NASA), gives you all the latest information on how to include an experiment in the next space shuttle. The cost of the experiments, called Get Away Special Payloads, ranges from \$3,000 to \$10,000. Gas Net tells about the latest results of experiments, who is going to be included in the next set of experiments, when and where conferences will be held on the subject, and factors to consider when sending an experiment into space. Use your modem to call (301) 344-9156 or contact:

Bob Pincus
National Aeronautics & Space
Administration
Goddard Space Flight Center,
Code 743
Greenbelt, MD 20771
(301) 344-5874

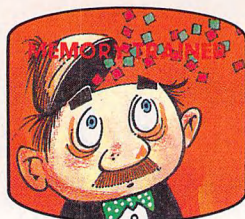
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CARI, Inc.
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Schaumburg, IL 60195
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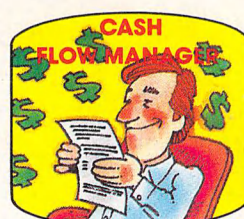
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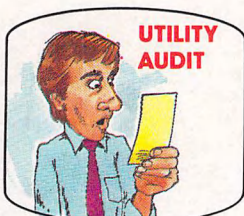
You are trapped in a five-story, 125-room structure made entirely of ice. Find the exit before you freeze!



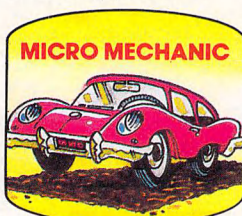
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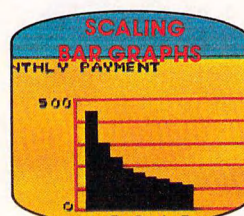
The beautiful princess is held captive by deadly dragons. Only a knight in shining armor can save her now!



Cut your energy costs by monitoring your phone, electric and gas bills.



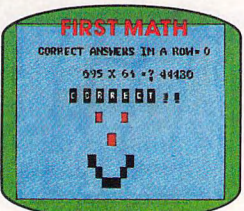
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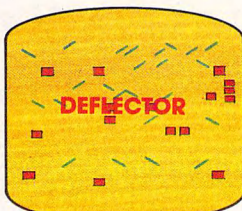
Create multi-colored bar graphs with a surprisingly small amount of memory.



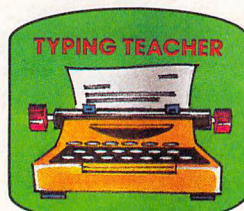
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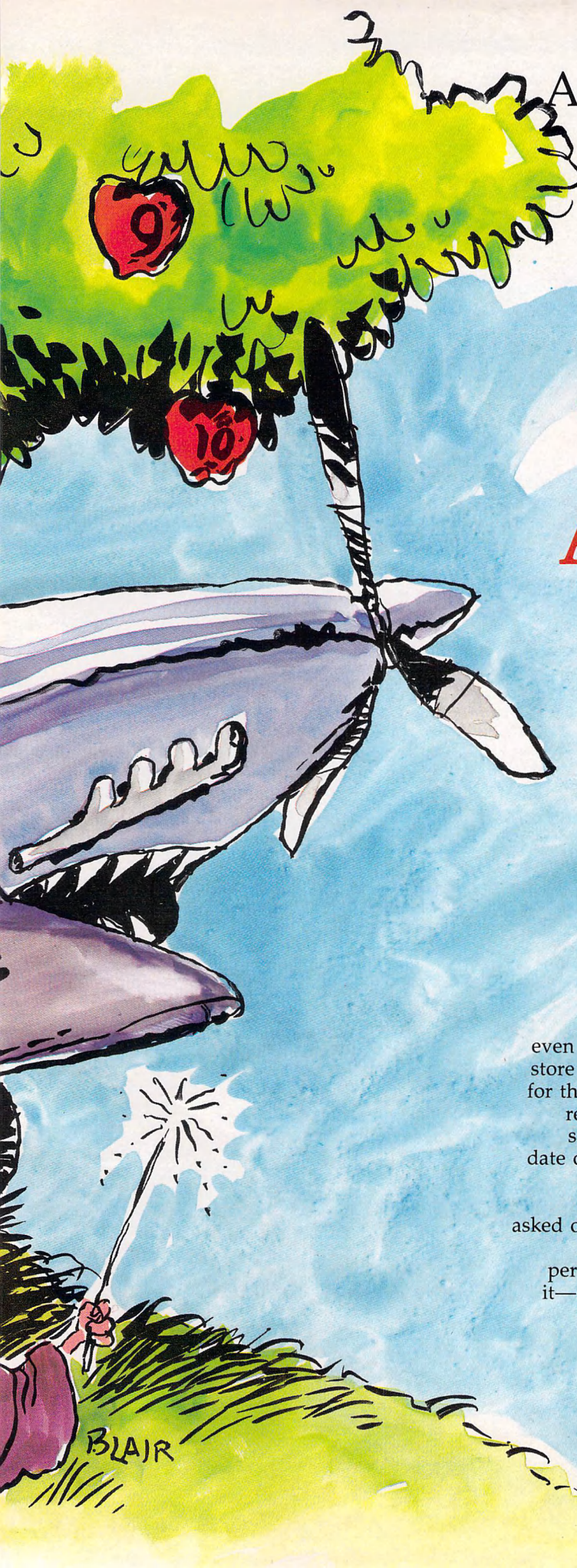
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A Game Lover's Choices

The 10 Best-Ever Apple Games

Dan Gutman

As cofounder and former editor of Computer Games Magazine, Gutman knows his stuff. Here he lists his choices for the ten best-ever games for the Apple computer.

Almost everyone has a "Best Ten" list. Book reviewers use them to highlight memorable works.

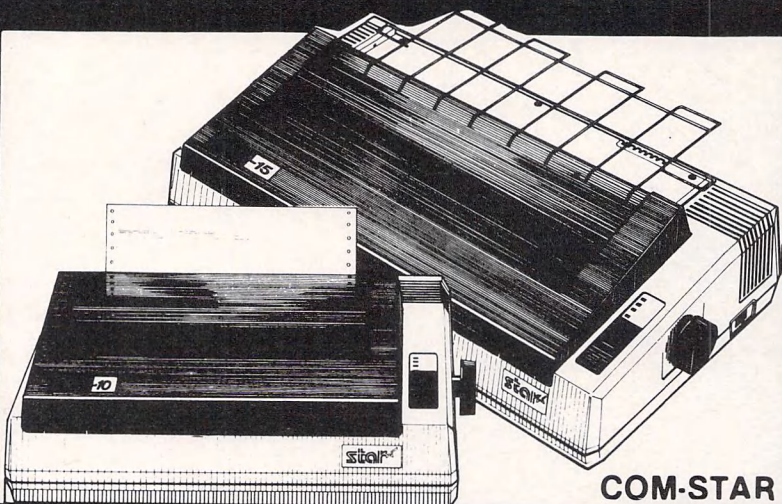
Movie critics prime us for the Academy Awards with theirs. Computer magazines even rely on them to illustrate software trends. Usually, though, these collections are year-end reports. The best of 1984, for instance.

This list is a bit different. It's not a best-sellers list, even though most of these games did well on the computer store shelves. Instead, I've looked at *all* the games available for the Apple computer line. My game-lover's choices aren't restricted to one kind of game—there are arcade games, simulations, even a word game included here—nor was date of release a factor. Some of the games I've picked have been out there for years.

What makes a good game? That's a question often asked of designers, reviewers, and players. There are as many answers as there are buyers. A game becomes notable, perhaps a classic, because there's something special about it—something that stays special, even when clones appear left and right. I've tried to point out these special considerations.

I've played hundreds of computer games. Some of you may have, too. So if you disagree, well, that's part of the fun of drawing up a list like this. Everyone can participate. All you need is an Apple computer.

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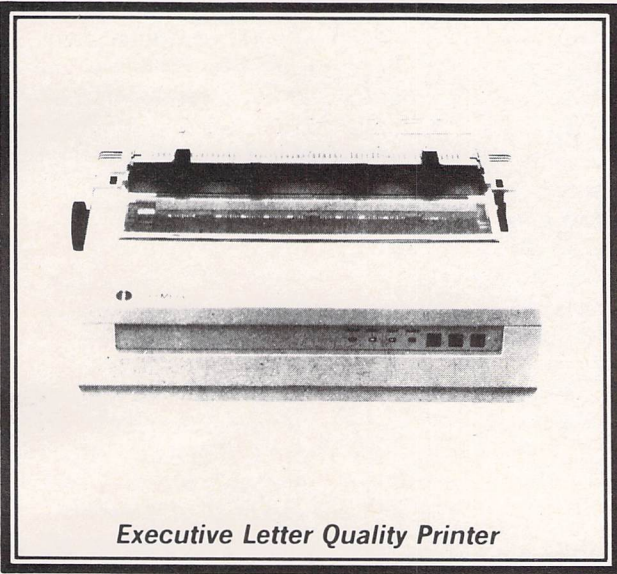
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You can't beat Brøderbund's *Lode Runner*. As a galactic commando, you'll be scooting over brick walls, up and down ladders, over trap doors, and hanging from bars. You've got to snatch up all the gold that the evil Bungeling Empire has ripped off from the people with their "fast-food taxes." Hordes of Bungeling guards chase after you like you're selling bootleg Cabbage Patch Dolls.

The attraction of this "ladder" game is not the action or the graphics, but rather the complexity. If you get past the first treasury room, there are 149 more, each with a different arrangement of ladders, bricks, and bars. And you can't just enter a room and eliminate the guards with your gun. Your weapon is a laser drill pistol, which can only be used to drill holes in the floor. The trick is to use your head and carve up the maze with a well planned-out strategy. *Lode Runner* is one of the few games to successfully combine action and intellectual strategy.

Even more impressive, *Lode Runner* allows you to create your own games. Each screen is made up of nine basic shapes which can't be changed. But you can put each brick, ladder, gold chest, or guard anywhere on the screen. Creating a game is tedious, but when you're done and the guards begin chasing you around, it's a real feeling of accomplishment. You can also save your own game screens.

As long as we're talking about creating our own games, I have to pick *Pinball Construction Set*, available from both the Budge Company and Electronic Arts. This game is truly remarkable. It gives you five original pinball games, sure. But it also gives you complete power to create your own game from scratch. You've got

slingshots, drop targets, kickers, flippers, bumpers, and even invisible ball eaters to work with. These can be positioned anywhere on the table; then you can play the game. You can also paint the screen with five colors and put your name or the game's title on the backglass.

It's more powerful than that. You can change the point values for your targets and monkey with the sounds they make when they're hit. You can even tinker with physics. Gravity can be manipulated so you can see what it would be like to play pinball in space. You can also manipulate the speed of the ball, the elasticity of the bumpers, and the strength of the flippers. *Pinball Construction Set* is the father of the computer simulation field, a very hot area right now.

You can't talk about simulations without mentioning SubLogic's *Flight Simulator II*. This one's been topping the charts for over a year now. There are plenty of other flight simulators, but it's like comparing a paper airplane with the space shuttle. *Flight Simulator II* is so much like the real thing that real pilots are using it as part of their training.

You've got an altimeter, turn coordinator, artificial horizon indicator, and just about every dial or gauge needed to take off, fly, and land a plane. You'll need them all to control the rudders, elevators, flaps, and throttle. With this game, you can't just hop into the cockpit and take a few barrel rolls over Lake Michigan. There are two 90-page manuals to study. The top half of the screen shows the pilot's-eye view through the windshield.

What makes *Flight Simulator II* particularly amazing is the scenery. The program actually has 80 real airports you can visit, from JFK in New York to LAX in Los Angeles. You can buzz around the Sears Tower in

Chicago, the Space Needle in Seattle, and the Statue of Liberty in New York. You can switch the display to look out either side of the plane, the tail, or directly below. The game (if it can be called a game) lets you fly during the day, at night, or at dusk.

Rumor has it there's a *Flight Simulator II* sequel in the works—several computer owners, connected by modems, will be able to fly in groups and actually see each other's planes. Until that happens, this is the best simulator you can buy.

As long as I'm up in the air, I have to mention the greatest shoot-em-up of all time—Atari's *Defender*. This one is over five years old now. Yet with all our technological advances, nobody's topped it. If you love to blow off steam, this is the game. You've got six kinds of enemies to contend with, each trying to get you in a different way. You can light up the screen with sprays of laser fire or use a smart bomb and blow up everything in sight. If things get bad, you can use hyperspace—ending up who knows where.

The game is special because it's the first shoot-em-up with a conscience. There are ten defenseless humanoids walking around on the planet, and you've got to save them from the landers, mutants, pods, swarms, and baiters buzzing overhead. In fact, even though *Defender* is a shooter's delight, the real purpose of the game is to rescue, not to kill.

But it's hard to think about that when the swarms close in on you. *Defender* isn't relaxing. It's a rush of adrenaline. It's a sensory experience that makes your palms sweat, the mark of an intense game. The home version captures most, if not all, of the thrill of the arcade classic. It's also living proof that gameplay is more important than graphics—*Defender* is basically blocky, simple, and black-and-white.

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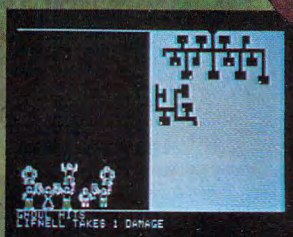
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An attack by killer bees in the colorful
countryside.



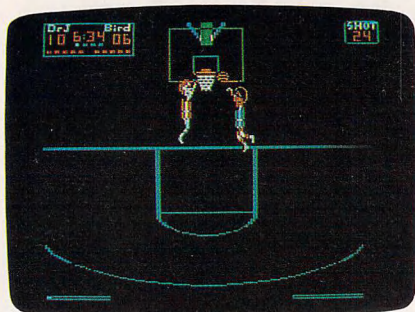
The wave of deadly monsters continues
as dwarfish Kobolds threaten your party.



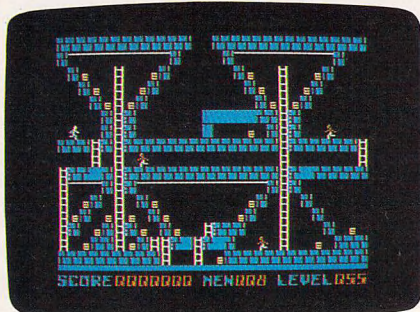
One of your comrades is injured by Chouls
during a search of the dungeons.

STARVILLE (11)			
1	HEEL	GNOME	PRIEST OKAY
2	SWAN	MINOTAUR	THIEF OKAY
3	MAGNIFICO	HUMAN	MONK OKAY
4	DELD	DWARF	WIZARD OKAY
5	HAMILTON	DWARF	PRIEST OKAY
6	FRED	ELF	WIZARD OKAY
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DROPP FROM PARTY			
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A sample composition of your party showing
race, class and status.



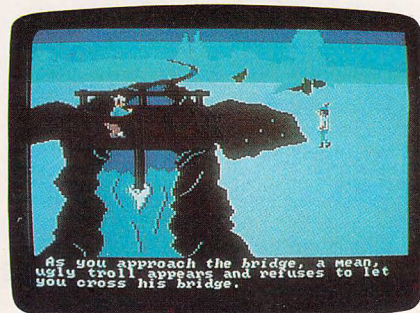
Dr. J goes for the basket in Electronic Art's One-on-One.



Each level is more complex than the last in Lode Runner, by Brøderbund.



A complete instrument panel and the view from the pilot's seat helps you fly in Flight Simulator II.



This is just one of the screens you'll see in Sierra On-Line's King's Quest graphic adventure game.

Speaking of black and white, how about those all-text games? Infocom's adventures have been the hottest-selling games over the last few years, and seem to be changing the whole field of literature from a passive experience to an interactive one. No pictures, here—the graphics are only in your head. All the Infocom games have become classics, and though most people would pick *Zork*, my favorite is *The Witness*. The murder mystery genre was made to become interactive some day, and that day has arrived. I like *The Witness* better than their other murder games (*Deadline*, *Suspect*) because it's a bit easier, and Stu Galley's Raymond Chandleresque writing is great.

The title of the game refers to you. Old man Linder gets plugged right before your eyes. The three obvious suspects—the Oriental butler named Phong, Linder's snooty daughter Monica, and Stiles, who was having an affair with Linder's wife (before she killed herself)—all have a motive to kill Linder. You've got twelve game hours to solve the crime, but it will probably take at least a few months of real time.

There are clues strewn all over the place, but a lot of the evidence is conflicting. Your faithful assistant Duffy is there to run things back to the lab for analysis. The game is incredibly captivating, and frustrating. If you really get stuck, just use your snub-nosed Colt on any uncooperative suspect. The game may be over, but you'll feel better.

Then, of course, there are graphic adventure games. Most of these look like bad cartoons that don't move. But Sierra's *King's Quest* is a marvel to look at. The scenery is colorful and looks more detailed than anything you've seen on a

computer screen. More revolutionary, there's some animation here, and you control it. Sir Grahame can be moved around the screen, and into the next screen. He can move behind and in front of trees or other objects, which gives a three-dimensional feel. And when he walks, his knees bend and his arms swing. That may not seem like a big deal, but it just doesn't happen in other games.

They've really paid attention to detail. If you jump Sir Grahame into the lake, there's a big splash and he'll tread water unless you hit the Swim key. When he talks with a man and woman in their hut, their eyebrows wiggle up and down. Instead of the same tree in every scene, you can see oak, spruce, elm, and others. None of this was really necessary, but it makes *King's Quest* look different, and better, than other graphic adventures.

King's Quest is populated by flying witches, evil sorcerers, wolves, purple trolls, and other oddball characters that make the game more than just a pretty picture to look at. It's really a turning point for adventure games.

The distinction between all-text or graphic adventure games and role-playing games is fuzzy, but there's no confusing *King's Quest* or *The Witness* with Sir-Tech's *Wizardry*, which is so popular it's been translated into German and French. The computerized dungeon master assigns levels of strength, I.Q., piety, vitality, agility, and luck to characters you've created. You decide if they'll be human, elf, gnome, dwarf, or hobbit. Then it's off to Gigamesh's Tavern to purchase weapons, armor, and a few magic spells. They'll be able to buy more later, if they've found some gold, and if they're still alive.

With your band of hardy characters fully equipped, you can plunge headlong into the pit.

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Some nice words about Adventures in Narnia games from a satisfied player.



"I like catching dufflepuds."

"I've played my share of computer games. But most are just 'me and my joystick,' and that can get boring. I mean, how long can you just zap and pow? ●

These games are different. They really take you to the land of Narnia. I've read the books by C.S. Lewis (you get one free with each game), but these games make it really come alive! ● In *DawnTreader*, for example, I get to captain a ship through uncharted waters, navigating around cyclones and sea serpents. Then I land on magical islands and chase dufflepuds! ● Sure, this voyage is loaded with action. But it's an interface™ game, so I use cards and dice in subadventures. I even let my sister play with me. Sometimes. ● I've got nothing but nice things to say about *Narnia* and *DawnTreader*. So I recommend you take your own trip to Narnia—soon. It's the best place I've ever been!"

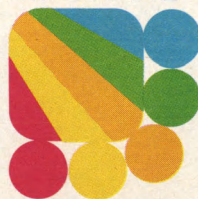
Tom Nice

11 year-old son of Bill and Janet Nice, happy purchasers of Adventures in Narnia interface games.

Narnia and *DawnTreader* are available at computer specialty stores and all fine bookstores, and they're compatible with Apple II Series® and Commodore 64™ home computers.



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Once you run into some Undead Kobolds, things get fast and furious. You can fight, parry, run, or cast a spell. If you choose to fight, a complete play-by-play is provided—"Moe slashes at zombie with sword! Misses. A Kobold stabbed Larry! Curly is dead!" and so on.

Skillful players will assemble progressively stronger bands of fighters, making the game addicting for real fans. There are two sequels—*Knight of Diamonds* and *Legacy of Llygamyn*—that make *Wizardry* even more compelling. It's not whether you win or lose, but how you role-play the game.

When I don't have three months to play *Wizardry*, I like to pop in the best maze game in the world—Atari's *Ms. Pac-Man*. This isn't *Pac-Man*. His girlfriend is different, especially on the computer. The game is harder. You can't invent sure-fire patterns and cruise around the screen (as you could in *Pac-Man*) because the ghosts have been programmed to move randomly. The maze is also different. While *Pac-Man* had only one game board, *Ms. Pac-Man* has four mazes, each harder than the last. Furthermore, she gets to go after seven kinds of fruit bouncing all over the maze.

Although eye/hand games have faded from sight since the glory days of videogames, *Ms. Pac-Man* stands the test of time. Now that the fad status is finished, we can look back and see that the premise of *Pac-Man* and *Ms. Pac-Man* made for a brilliantly addicting game. Things chase you around an intricate maze, but if you perform a certain act, you get to chase them around the maze for a short time. This idea of "turning the tables" was totally original at the time. Hundreds of games have come and gone since *Ms. Pac-Man* was introduced, but almost all of them were just variations on a theme. *Ms. Pac-Man* is as exciting today as it was when it was making headlines.

Sports games are tough to translate to computers. The designer can't dream up weird creatures or scenes; the game has to look like the real thing. Most sports games look like cave drawings, with one exception—*One on One* by Electronic Arts. Like most of the games here, it towers above others in its field by virtue of its complexity. You're not just shooting hoops with a faceless opponent, it's Julius (Dr. J) Erving against Larry Bird, the two toughest players in the NBA.

The game reflects the differences between these men. If you choose to be Bird, you'll be a better rebounder, more intimidating on defense, and you'll shoot better from the outside. If you choose to be Dr. J., you'll be faster, you'll be able to do fancier moves, and you'll hang in the air longer. *One on One* is also the first game to include certain sports realities—hot streaks and fatigue. Two bars on the bottom of the screen show the fatigue levels of both players. If you get tired, your shooting percentage deteriorates.

Designer Eric Hammond even found room to add a few touches just for fun. Occasionally you'll slam dunk and shatter the backboard, causing a high-res janitor to march out and sweep the glass away. You may also see an instant replay of particularly awesome moves. The game is great fun all around.

Another great game that has been translated very well to computers is *Boggle*, the popular word game played with cubes. Hayden's *Word Challenge* is virtually identical to *Boggle*, and may even be an improvement on it. The idea of the game is that the player is

presented with a grid of 16 letters and must try to find as many words as possible within those letters, and within a certain time limit. The more words you find, the more points you earn.

Playing on a computer has certain advantages over pencil and paper. You type all your words into the keyboard and the score is kept on the screen. That means you don't have to take your eyes off the display, which is one of the annoyances of *Boggle*. The computer also allows you to change the size of the playing grid— 3×3 , 4×4 , or 5×5 .

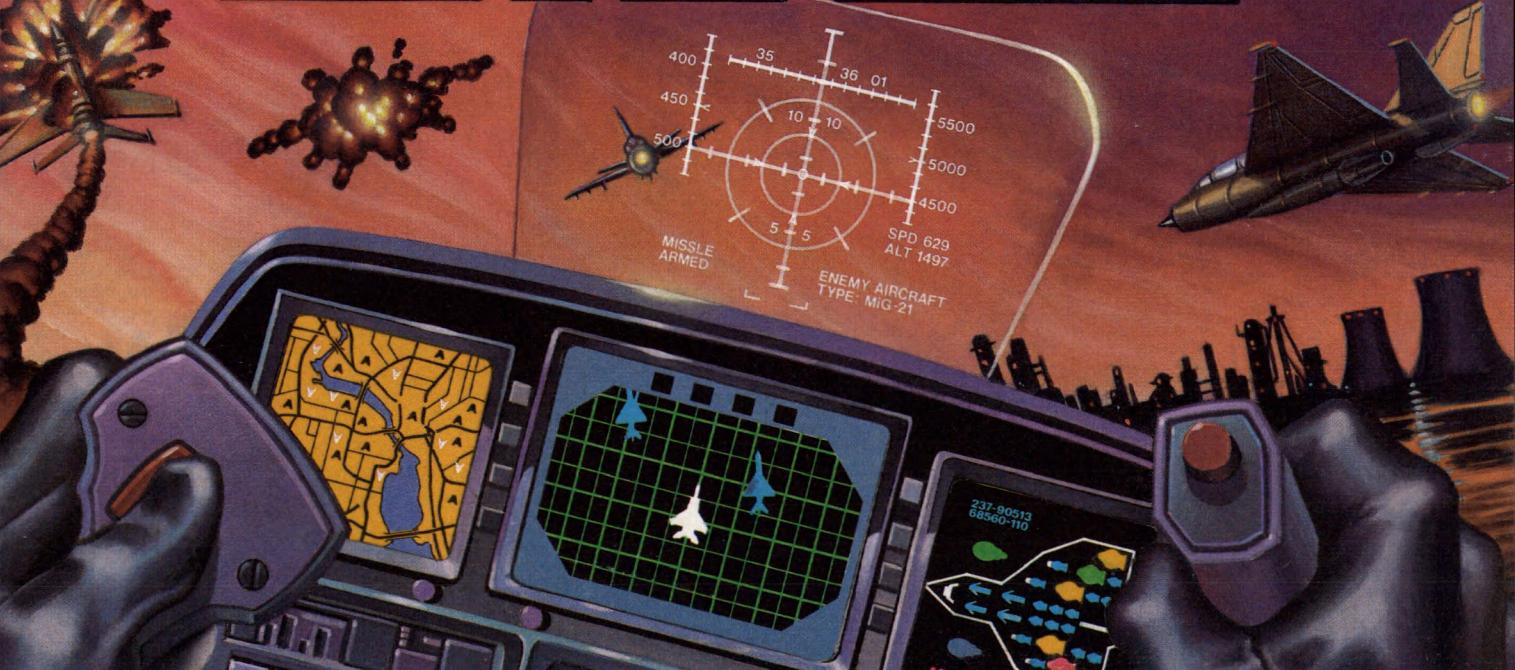
The biggest advantage of *Word Challenge* is its 90,000 word vocabulary. Don't ask me how they shrank the dictionary down to 93K, but they did. After you find all the words you can, the computer will tell you all the words you *missed*. You'll feel pretty dumb at first, but it's educational. The game is a great way to exercise your mind instead of your thumb for a change.

That's my list. Of course, there are always runners-up. Because I'm sure all of you won't agree with my ten choices, I'd like to add a few more of my favorites:

Choplifter (Brøderbund), *Castle Wolfenstein* (Muse), *Demon Attack* (Imagic), *Pitfall* (Activision), *Millionaire* (Blue Chip), *Star League Baseball* (Gamestar), *Sargon III* (Hayden), *Summer Games* (Epyx), *Miner 2049er* (MicroLab), *Boulder Dash* (First Star), and *Pole Position* (Atari).

By the way, *Lode Runner*, *The Witness*, *Wizardry*, and *Word Challenge* are all available for the Macintosh. Some of the others may well be running on the Mac by the time you read this.

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What Makes Superior Educational Software?

Ann Piestrup

It's nearly impossible to pick good learning software simply by its package. How can you choose from such a bewildering array? Of the 10,000 educational products available, few, I believe, really tap the power of the microcomputer. Not all software is worth the cost to parents.

To choose wisely, you'll need to do some homework. If possible, preview software before you buy. Your library, school, science museum, software dealer, friends, or user's group are excellent places to start. If you can't preview a program, read its reviews carefully, and ask around. You need to decide whether the software meets your child's needs and fits his or her learning style. And if you're spending \$30-\$50 on a learning game, you want to be sure it will hold your child's interest for more than a few hours.

What To Look For

Educational programs for children are most effective when they offer *playful* as well as *powerful* learning. Software must also be robust and easy to use, aesthetically pleasing, and consistent with your social and moral views. Parents are used to applying these standards to toys and books, but because this medium is new, they know less about what software children like and really use. The points that follow are not immediately obvious when you evaluate software, but they'll help you formulate notions of what you can expect in fine software.

Picking an educational program by its cover can be disastrous. To find the superior software, you have to look at its approach, design, and aesthetics. Ann Piestrup, an award-winning software designer and chairperson of The Learning Company, points out what makes programs worthy of your consideration.

Powerful Learning

Educational research indicates that two factors which affect learning are whether a child is active or passive, and how much time the child spends concentrating on a task. Powerful software encourages the learner both to spend time with the program (because it's enjoyable) and to participate actively in the lesson.

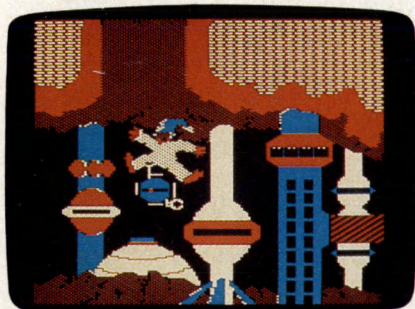
A well-focused program thoroughly treats a related set of concepts. Many programs on the market are bewilderingly broad; for instance, some promise to teach numbers, letters, shapes, colors, names and drawing skills, all in one package. They do many things, but none well. At the other end of the spectrum are boringly narrow programs which cover the equivalent of two or three days' school lessons on a single subject. A well-designed program can strike a balance between the two extremes. Each part of the program can focus on a specific concept, and when the player has mastered that concept, he or she can move on to the next game.

The game or activity can vary in ways that allow children to play repeatedly with continuing interest, like different hands dealt during the same card game. For example, in *Reader Rabbit*, all four games in the series focus on three-letter words from the *American Heritage Dictionary*. For the *Sorter* game, all the words with a certain letter, such as an initial *m*, appear. Some of the same words appear in *Match*, where all picture words of a certain type, such as animals or household objects, appear. Thus children get enough experience with the program's content to incorporate it into their thinking.

Independent of a program's content, its structure can determine whether a child will use it easily and benefit from it, or get stuck and become frustrated. Well-designed programs present information in manageable steps, not exceeding the cognitive load the mind can absorb—a carefully measured amount of new information accompanies a proportional amount of things familiar.

A learning game can move from easy tasks to harder ones in understandable steps and with smooth transitions. A young child should never be faced with frustrating, insurmountable obstacles. Clear, easily understood prompts and clues help to assure that the child can manage the program independently. The program can guide the learner with prompts throughout the learning experience without mapping out a rigid pathway from lesson to lesson, leaving the learner free to move from one game to another at will.

One way to encourage active, effective learning is to provide an open-ended, exploratory environment. A good example is *Robot Odyssey I*, which includes an adventure game and an Innovation Lab, along with structured tutorials. The adventure game poses challenges that require the player to design chips to run robots. Players learn how to do this in the tutorials, and implement their designs in the Innovation Lab. The machines they build are the ones they use to win the game. Solving all five levels of the game requires a great deal of



In Robot Odyssey I, you create a robot in the Innovation Lab and run it through its paces in an adventure game.

thought and experimentation, and takes about 100 hours of play.

Another approach is to include an editor within the program, so that the player can change the playing board, characters, parts, or parameters of the game to suit his or her own taste. This opens the possibility of a nearly infinite number of patterns in a game,

and gives the player a sense of personal control. *Lode Runner* and *Pinball Construction Set* are two popular games that have editors to let the player make a new game board. Some educational programs that have editors include *Bumble Games*, *Magic Spells*, and *Rocky's Boots*.

Powerful Learning Software Can Be Playful, Too

Play is often an effective motivator and a good vehicle for learning. A playful learning game can keep a child engaged and interested much longer than simple drill. Playfulness in software, however, involves much more than a flight of fancy and a taste of whimsy. Careful thought goes into the underlying design of a program that keeps a child playing and learning for a long time.

To be intriguing, the game's subject and characters should match the player's interests. Since these change as a child grows older, different sorts of games will appeal to children of different ages. Young children are attracted by cartoon characters, like the ones they see on television. Characters can stimulate fantasy; children can build their own stories around characters in a program. Often young children talk to the characters on the screen, asking questions or commenting on the game. Older children might be more interested in creatures from outer space, robots, or unicorns. Teenagers may not be interested in game characters at all.

Humor and unexpected events in a game also help maintain a child's interest. If these are intrusive, too frequent or too repetitive, they quickly lose their appeal. Since nearly everything

in software repeats itself, it's difficult to maintain humor. Little children enjoy silly dances of fanciful creatures and find them funny over and over. In *Kermit's Story Maker* players can make ordinary sentences, such as "Miss Piggy sings in the theater," but silly sentences, such as "Kermit flies in the bathtub," work just as well. Children are delighted when the bathtub sprouts wings and flies off.

In some programs, an element of risk is appropriate to add excitement. A timer can add a beat-the-clock kind of excitement to games for older children. Another way to add excitement is to make the game competitive, so that a player can match his or her skill against another player, or against the computer.

A learning game for young children works best if it's warm in tone, not judgmental or negative. Negative reinforcement for wrong answers, including nasty noises, discourages children. A loud BZZZT after each wrong answer tells everyone in the room that the player made a mistake!

Programs can be structured so that correct answers work and incorrect answers don't. One game in *Gertrude's Secrets* has a Guess My Rule box. Perhaps the box wants only purple objects. To discover the box's rule, the player picks up a puzzle piece and drops it in the box. If it doesn't fit the rule, the piece simply floats out of the box without a sound. When all purple objects are in the box, the screen flashes and plays music, and Gertrude the Goose flies in to deliver a prize.

Learning programs can give a sense of closure and accomplishment. That is, programs should have an end, a logical conclusion, a way to win. Just like their elders, kids appreciate rewards and recognition for their achievements.

Some children gain confidence when they win a reward for each stage they complete. Rewards that the player can collect and keep throughout the game, building up an impressive pile, are specially prized. This kind of reward is unnecessary for children who delight in learning, but can be a help for children who have had a difficult time in school and need extra encouragement. In testing our software, we found that children played reading, math, and logical thinking games much longer when there were little graphic rewards on the screen. The children were very clear about what constituted a worthwhile prize—an electronic picture of a computer, roller skates, or a plane was a better prize than a picture of a potted plant or bowl of fruit.

Usable Software

Designing software that's easy to use is a challenge. Frustration with the mechanics of the program can distract the child's attention and take the fun out of the game. Good software should be free of bugs and not crash-prone, of course, but it should also be robust enough to withstand the unexpected ways children may use it.

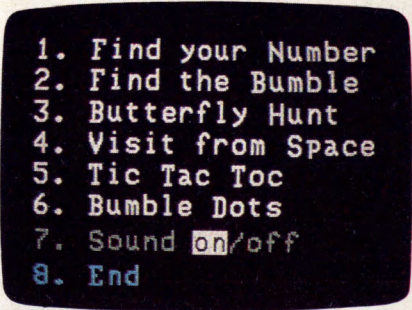
A program's opening screens are much like

the first few minutes of a movie. Learning games need to get the title, author, company, and copyright information out of the way, attract the player's interest, and show how play begins—all within two or three screens. Badly designed software blocks the player's entry into the game with a series of questions, screen after screen of detailed instructions, or flashy graphics that drag on forever. On the other hand, some programs leave the player hanging in limbo, with no idea how to make the program work.

Well-designed software has brief, clear opening screens with choices simply laid out, so that the player can get to instructions if necessary, can choose which game to play, and can make decisions about how to play the game (one or more players, sound on or off) quickly and easily. If the questions and options were presented one by one in a linear sequence every time the program began, children would get bored before they even reached the game.

There's a trade-off between user control and simplicity, however. The more choices the user has, the more complicated the directions must be. The solution is to make choices and customization optional—play can start immediately with default settings, but if the player wants to change something, he or she has that option. Some programs offer an easy bypass around the introductory screens for players who have used the program before. In Learning Company programs, for example, the player can move directly to the game selection menu by pressing the space bar as the program loads.

Picture menus help nonreaders

- 
1. Find your Number
 2. Find the Bumble
 3. Butterfly Hunt
 4. Visit from Space
 5. Tic Tac Toc
 6. Bumble Dots
 7. Sound on/off
 8. End

This opening screen clearly shows the choices a child has at the beginning of Bumble Games.

run programs without help from adults. Recent programs for young children are very simple to use, offering few choices and causing very little confusion.

Most programs show the player instructions of some kind. These can be pages of text, sample games that run by themselves with commentary, or tutorials that unfold the game's key points. When you try a program, you can quickly judge whether its instructions are helpful. If you don't understand how to play in a moment or two, think twice about buying the program. Adventure games and some other packages with long play value are exceptions.

The commands that run a program need to be accessible, so that the user is not forced to interrupt a game to look something up. One approach is to list common commands, and the keystrokes that invoke them, on the screen. This keeps them handy, but clutters the limited space on the screen. A better approach is to make the commands

simple and easy to remember, so that the player can use them automatically during the game. Once commands become automatic, the player can concentrate on the task at hand. Each command should be a single key-stroke if possible, and should be logical and intuitive, like ? for help, G for go, or *Escape* for getting out of the program.

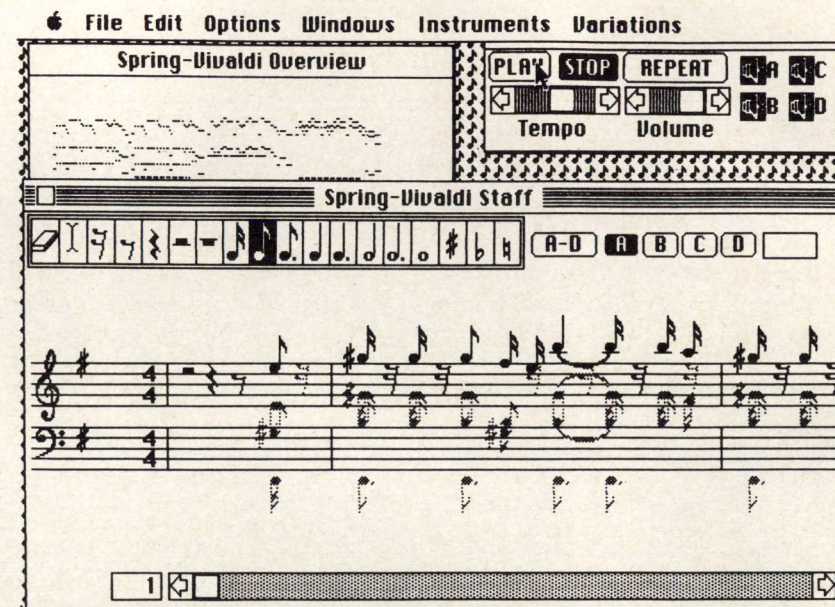
Even better are the new pull-down menus in programs such as *MacPaint* and *MusicWorks* for computers like the Macintosh, and software like *Dazzle Draw* for the Apple IIc. These pull-down menus offer users many choices which can be immediately made by pointing a cursor and pressing a key or mouse button. The menus disappear when they're not in use, so they don't clutter the screen. Future software will probably use this approach more and more.

Since few children can type well, it helps if commands are brief, preferably one letter to represent a word. Even young children can find three or four letters on a keyboard to run a game. They can also find the letters of their name and enjoy doing this once in a while. Brief screen instructions are important, too, for children who are not fluent readers.

Many programs offer several games on the menu, and other options such as sound on/off, so it's important that a child be able to get out of whatever he or she is playing and get back to the main menu. A key such as *Escape* can be dedicated to that purpose.

Aesthetics

Just as in toys or books or movies, programs that are going to be used for a long time should



MusicWorks screen on the Macintosh

be pleasing to the eye and the ear. This industry is still in its youth, however, and publishers often settle for standards that would not be acceptable in a book or magazine, like text that runs to the edge of a screen, or amateur graphics.

Words can be printed beautifully, with layouts that help the reader understand what is printed, or they can be garbled and hard to read. The art of text screen design is just beginning to be applied to software.

Text fonts for small children's programs should resemble those in school books; it's hard enough to learn to read without facing letters with unfamiliar serifs or strange shapes. On the other hand, games for older children or teenagers can include interesting fonts that match the mood of

the game and enrich the program.

Programs vary greatly in their graphics quality. This is something you can see as soon as you use the program. Early software on the Apple II was extremely limited in its resolution and choice of colors. Pictures looked much like needlepoint canvases. A clever use of the medium could be very attractive, but many programs still on the



Dazzle Draw includes pull-down menus which let you quickly select commands and features.

market using these low-resolution pictures simply look coarse and blocky. Advances in software have brought a broader range of colors and improved picture resolution, and therefore better art.

Graphics can be functional or merely decorative. Functional graphics respond to a child's actions with reactions. For example, in *Bumble Games*, the player types a letter and number defining a coordinate on a grid. The program responds by highlighting the selected column and the row, then fills in the point at the intersection. The child sees exactly what it means to plot points on a grid. *Kermit's Story Maker*, *Gertrude's Secrets*, and *MusicWorks* are other programs that use functional graphics well. The computer is the only medium that can respond to a child's action, like pressing a key, with a specific response—it's a shame to waste such a powerful tool on graphics that simply decorate the screen.

A few learning programs use realtime animated graphics (graphics that are under the user's continuous control), and allow complex interactions among the objects on the screen. Examples of programs that use this kind of graphics are *Robot Odyssey I*, *Pinball Construction Set*, and *Rocky's Boots*.

Any sound or melody used in a learning game will be repeated many times if the game is played often. A pleasant sound is hard to achieve on the Apple II, so it's very important that sound in any program be optional. Some programs use pleasant, catchy melo-

dies that help draw attention to the action on the screen, but even these may become tiresome eventually. Be sure that any program you buy offers the option of turning the sound off. Newer programs have achieved music with variation in volume, and with several voices, and are much easier to listen to.

Values In Software

Software that comes into your home should match your values. If you are concerned about violence on television and in movies, you might want to think twice about software where the object is to slaughter aliens or blow up worlds. Apply the same judgment to software that you use in choosing toys and books, but be aware that, because this is a relatively young industry, not all publishers are careful about the values built into their products.

Much of the learning and game software on the market is designed around themes that appeal more to boys than to girls. This is because many more boys than girls use computers. If you

have girls, look for software that matches their interests. Look carefully, however, at software that's advertised as being specifically for girls. Some of these programs portray girls as passive, unadventurous creatures cast in insipid roles.

While avoiding negative values, like violence and sexism, it is possible to choose software that encourages positive values, such as cooperative play and persistence. Children may learn to share information, plan together, and take turns while using complex programs, like adventure games such as *Hitchhiker's Guide To The Galaxy* and *Zork*.

Many of these characteristics of good software are hard to recognize when you first look at a program. If you make the investment in time and effort to evaluate software *before* you buy it for your children, you can build a library of programs with real learning and play value. A computer is simply a pile of metal and plastic without software; good software can transform your home computer into a powerful learning tool.

Although there are certainly many other superior software products on the market, these are the learning games cited as examples in this article.

Bumble Games, The Learning Company, Menlo Park, CA
Dazzle Draw, Brøderbund, San Rafael, CA
Gertrude's Secrets, The Learning Company, Menlo Park, CA
Hitchhiker's Guide To The Galaxy, Infocom, Cambridge, MA
Kermit's Story Maker, Simon and Schuster, New York, NY
Lode Runner, Brøderbund, San Rafael, CA
MacPaint, Apple Computer, Inc., Cupertino, CA
Magic Spells, The Learning Company, Menlo Park, CA
MusicWorks, Hayden Software, Lowell, MA
Pinball Construction Set, Electronic Arts, San Mateo, CA
Reader Rabbit, The Learning Company, Menlo Park, CA
Robot Odyssey I, The Learning Company, Menlo Park, CA
Rocky's Boots, The Learning Company, Menlo Park, CA
Zork, Infocom, Cambridge, MA

EDUCATIONAL

Software Buyer's Guide

Apple II computers have dominated educational computing for years. Much of the reason lies in the huge number of educational software packages available for the Apple II, II+, IIe, and IIc. With the advent of the Macintosh, and its unexpected success in the home market, even more programs are appearing on the shelves.

Thousands of educational programs exist for Apple computers. Much more than you can look at yourself, or find at a local software store. They range from educational games to packages which

drill and test. Some teach the ABCs while others delve into Mendelian genetics.

Just because you don't find a program in this list doesn't mean it's not acceptable. The buyer's guide is not exhaustive. But it does represent a broad sampling of what you'll find.

Keep in mind that prices and machine availability often change. You may be able to find some of these programs at discounted prices, and many educational packages are being rewritten to take advantage of the Macintosh's unique abilities.

Data for this guide was supplied by .MENU—The International Software Database Corporation. For further evaluative information and ordering, contact .MENU, 1520 South College Avenue, Fort Collins, CO 80524. The toll free number is 1-800-THE-MENU or 303/482-5000 (in Colorado or outside the USA). Telex ISD 454590. When ordering, note the International Standard Program Number (ISPN).

Product	Price	ISPN	Publisher/ Vender	Systems	Description
Language Arts					
Adjectives: Adding New Ideas to Nouns & Pronouns	34.95	38887-003	Intellectual Software	Mac	Covers the use of adjectives, kinds of adjectives, and comparison of adjectives.
Alien Action	44.00	26493-050	DLM Teaching Resources	II+, IIe, IIc	Invading spaceships are repelled and the missile base saved when students supply correct answers.
Alphabet Zoo	29.95	75300-061	Spinnaker Software	II+, IIe	This package includes two exciting maze games that teach children the relationship of letters and sounds and how to spell.
Comprehensive Grammar Review I	44.95 54.95	38887-126	Intellectual Software	II, II+, IIe Mac	This package includes a hardcover textbook. The Apple disks containing the classroom management system are \$54.95. Grades 7-12.
Creative Writing/That's My Story	49.95	43950-175	Learning Well	II+, IIe	This program provides motivation and method for practice in writing creatively, cooperatively, or individually.
Creature Creator	29.95	24936-083	Designware, Inc.	II, II+, IIe, IIc	Create your own creatures from a selection of heads, bodies, arms, and legs. Gives children confidence in controlling the computer.
Easyreader Reading Comprehension Skills I, II, and III	39.95 each	02890-360, -380, -400	American Educational Computer	II, II+, IIe	These programs help to develop the ability to read with understanding. For grades 1-3.

Product	Price	ISBN	Publisher/ Vender	Systems	Description
French Create-a-Vocabulary	49.95	19562-325	Control Data Corp.	II+	This package is a versatile vocabulary-building lesson that comes with lesson disks, back-up disks, and a user's manual.
Homonyms in Context	69.00	65143-510	Random House School Division	II+, IIe	This program engages word play exercises to help students learn their homonyms.
Introduction to Poetry: Understanding Meter	29.95	60150-370	Peachtree Software	II, II+, IIe	Presents the fundamental concepts of meter in a simple and engaging tutorial format.
Learning About Words	34.95	38887-320	Intellectual Software	Mac	This program presents consonant combinations, prefixes, suffixes, and root words.
Macedge	49.00	81375-500	Think Educational Software	Mac	<i>Macedge</i> is designed as a multilevel package that focuses on two fundamental aspects of learning—math and reading.
Magic Slate	65.00	77038-500	Sunburst	II, II+, IIe, IIc	<i>Magic Slate</i> transforms your Apple into an easy-to-learn word processor that makes writing and editing a pleasure.
Magic Spells	34.95	43870-425	The Learning Co.	II, II+, IIe, IIc	This program enables children to sharpen spelling skills in <i>Magic Spells'</i> adventure world of castles, demons, and wizards.
Moptown	50.00	03900-460	Apple Computer, Inc.	II+	A program that helps children ages 4 and up learn logic and language concepts.
Practical Composition I—Making Words Work	34.95 44.95	38887-501	Intellectual Software	II, II+, IIe Mac	This package is a teaching tool for instruction in choosing the correct words in composition.
Print Shop	44.95	08850-110	Brøderbund	II, II+, IIe, IIc	Design and print your own stationery, invitations, greeting cards, announcements, and more. Various font styles, type styles, and border designs available.
Review of American Literature	59.95	38887-615	Intellectual Software	II, II+, IIe	This is a ten-program package containing multiple-choice questions with each wrong answer branching to an explanation.
Romper Room—I Love My Alphabet	34.95	30838-066	First Star Software	II, IIc	This educational package is an entertaining and effective way to teach the alphabet while developing other cognitive skills.
Spanish Vocabulary Builder	39.95	19562-845	Control Data Corp.	II+, IIe	This package is designed to improve students' familiarity with Spanish and comes with lesson disk, back-up disk, and user's manual.
Speed Reader II	69.95	24075-125	Davidson and Associates	II, II+, IIe, IIc	Lengthen your attention span and improve your concentration to become a more efficient, productive reader.
Stickybear ABC	39.95	87087-400	Xerox Education Publications	II, II+, IIe, IIc	An ABC program for 3–6 year olds, with colorful graphics.
Story Machine	29.95	75300-400	Spinnaker Software	II, II+, IIe, IIc	<i>Story Machine</i> is an educational game that helps children learn to write sentences, paragraphs, and simple stories.
Webster: The Word Game	32.95	11670-960	CBS Software	II, II+, IIe, IIc	This game helps children recognize and spell familiar words.
Whole Brain Spelling	34.95	76950-600	Sublogic Corporation	II, II+, IIe	A spelling tutorial program with six word list categories, each of which includes 2000 words. For ages 8 to adult.
Wizard of Oz	26.95	96927-725	Windham Classics	II, II+, IIe	A graphic text adventure based on the <i>Wizard of Oz</i> .
Word Attack	49.95	24075-300	Davidson and Associates	II, II+, IIe, IIc	A vocabulary system that makes learning new words fun and easy.
Word Challenge	39.95	34925-490	Hayden Software	II+, IIe, IIc, Mac	A computer adaptation of the famous word game Boggle. (Macintosh version to be named <i>Word Challenge II</i> .)

Mathematics

Algebra, Volume 1	39.95	60150-212	Peachtree Software	II, II+, IIe	<i>Algebra, Volume 1</i> is one in a sequence of six independent volumes which comprise a first-year course in algebra.
Alien Addition	34.00	26493-075	DLM Teaching Resources	II+, IIe, IIc	Provides practice in basic addition facts using an alien invasion theme, complete with spaceships and laser cannons.
Computergarten	49.95	68075-405	Scholastic, Inc.	II+, IIe, IIc	A motivational computer awareness program which incorporates the development of basic early childhood skills for grades preschool–1.
Division I	29.95	54375-050	Mindscape, Inc.	II, II+, IIe	This package, part of the mathematics courseware series for grades K–6, provides a fun way to learn math basics.
Fractions	175.00	64050-400	Quality Educational Designs	II+, IIe	This package of six disks includes tutorial and exploration programs written to teach students to understand and use fractions.
Geometry I: Planely Simple	35.00	50500-204	Micro Lab	II, II+, IIe, IIc	Balances the abstract concepts and practical application of plane geometry.
Graphing	34.95	50950-260	Micro Power & Light Co.	II, II+, IIe, IIc	Presents beginning algebra students with exercises involving lines and slopes.
Math Blaster	49.95	24075-075	Davidson and Associates	II, II+, IIe, IIc	<i>Math Blaster</i> contains over 600 problems in addition, subtraction, multiplication, division, fractions, and decimals for students 6–12.
Mathematics Word Problems—Grade 6	24.95	38887-401	Intellectual Software	II, II+, IIe, Mac	Working with word problems appropriate to grade 6, with each problem fully explained.
Mission: Algebra	44.95	24936-415	Designware, Inc.	II, II+, IIe, IIc	A tool for practice in solving linear equations.
Number Stumper	39.95	43870-481	The Learning Co.	II, II+, IIe	This electronic version of a fourteenth century game of chance teaches addition, subtraction, and strategic thinking.

Product	Price	ISBN	Publisher/ Vender	Systems	Description
Sports Problems 3	39.95	38887-694	Intellectual Software	II, II+, Ile, Mac	Provides math word problems with high interest level to young sports fans, grades 7-9.
Stickybear Numbers	39.95	87087-600	Xerox Education Publications	II, II+, Ile, IIC	A numbers program for 3-6 year olds featuring color graphics.
Success with Math: Multiplication/Division	24.95	11670-800	CBS Software	II, II+, Ile, IIC	Essential multiplication and division topics are covered in this package for the student in need of remediation.
Superex MacStat	99.95	77093-069	Superex Business Software	Mac	MacStat has been programmed to give you all the necessary formulas you need to calculate and analyze your data quickly.
Webster's Numbers	39.95	60150-960	Peachtree Software	II, II+, IIC	Creates a magical environment in which the fundamental concepts of numbers become exciting adventures.
Science					
Apple Physics	34.95	50950-175	Micro Power & Light Co.	II, II+, Ile, IIC	Entertaining graphics test students' understanding of parabolic and simple harmonic motions.
Astronomy I—Introductions	36.00	27850-035	Educational Courseware	II, II+, Ile, IIC	Use high-resolution graphics to introduce your students to important stars and constellations. For grades 7 and up.
Biobits III	60.00	14850-090	Compress	II+	Teach growth in populations and organisms using computer models.
Biology 1	79.95	38887-072	Intellectual Software	II, II+, Ile, Mac	A comprehensive interactive tutorial with quizzes. Each wrong answer branches to further explanation.
Body Shop	59.95	34925-008	Hayden Software	Mac	Includes a collection of MacPaint documents containing images of human anatomy drawn to scale.
Cell Defense	34.95	36550-020	Human Engineered Software	II	This program lets the user control the immune system of the body to eliminate the spread of infection.
Discover: A Science Experiment	55.00	77038-200	Sunburst	II, II+, Ile, IIC	The objectives of this program are to collect data, draw conclusions, and formulate hypotheses. For grades 6-12.
General Chemistry 1	79.95	38887-259	Intellectual Software	II, II+, Ile	General Chemistry I is a comprehensive interactive tutorial with quizzes. Topics covered include chemical properties of elements, atomic structures, and chemical reactions.
Mendelian Genetics	70.00	14850-600	Compress	II+, Ile	An interactive computer-simulated laboratory in Mendelian genetics written in BASIC.
Superex MacScience Physics	99.95	77093-068	Superex Business Software	Mac	Provides the user with preprogrammed formulas to solve many physics problems.
Social Science					
Dinosaur Dig	49.95	11670-138	CBS Software	II+, Ile, IIC	An educational adventure into the lost world of dinosaurs.
Great Maine To California Race	29.95	34925-024	Hayden Software	II, II+, Ile	A geography game for children ages 10 and up in which two players race dragsters from the East to the West.
Macroeconomics I	39.95	38887-360	Intellectual Software	Mac	This economics package contains: The Nature of Economics, National Income Accounting, and Income Determination.
Mapmaker	60.00	47750-330	D.C. Heath & Co.	II+	Allows students to explore and study maps, and design their own maps of cities, states, countries, and fictional lands.
Rails West!	39.95	76500-660	Strategic Simulations, Inc.	II, II+, Ile	Experience the exciting and risky world of railroad building in the West. Raise money, start your company, and strive for profits.
Save the 'Kung	34.95	50950-390	Micro Power & Light Co.	II, II+, Ile, IIC	A simulation enabling you to prolong tribal existence by manipulating nine essential parameters.
Seven Cities of Gold	40.00	28512-100	Electronic Arts	II, II+, Ile, IIC	A strategy game set in 1492, this simulation of the exploration of the New World includes sea voyages, trading with natives, and searching for gold. Generator creates new worlds to explore.
World Geography Adventure I	59.95	38887-826	Intellectual Software	II, II+, Ile, Mac	This package covers the Americas and includes a full-color wall map.
Art and Music					
Art—Perspective Drawing	44.00	54725-014	MECC, Minnesota Educational	II, II+, Ile	A sequential and self-paced instruction, Art—Perspective Drawing introduces the study of one- and two-point perspective.
Dazzle Draw	59.95	08850-062	Brøderbund	Ile, IIC	A graphics illustration package that is easy for beginners, yet creates the professional quality graphics used by designers.
Ear Challenger	39.95	28525-025	Electronic Courseware	II+, Ile	This is an aural-visual game to increase tonal memory of a series of pitches.
Hey Diddle Diddle	29.95	75300-200	Spinnaker Software	II, II+, Ile, IIC	A collection of 30 classic nursery rhymes featuring brilliant color graphics and lively music.
Mousepaint	149.00	03900-470	Apple Computer, Inc.	II, II+, Ile, IIC	A graphics program packaged with the Apple II pointing device. Create, load, save, modify, and print high-resolution designs by moving the mouse.
Mr. Metro Gnome/Rhythm I	69.00	55862-500	Wenger Computer Software	II, II+, Ile	This program provides an animated Mr. Gnome who taps his foot to teach basic rhythm.
Music Construction Set	40.00	28512-079	Electronic Arts	II, II+, Ile, IIC	A computer music program that a child or a maestro can enjoy. It doesn't require years of piano lessons or learning computer codes.
Music Maker	39.95	76950-350	Sublogic Corp.	II, II+, Ile	A music utility and education program.

Product	Price	ISBN	Publisher/ Vender	Systems	Description
Music Theory	49.00	54725-724	MECC, Minnesota Educational	II, II+, IIe	Eighteen music theory programs combine Apple graphics and sound for drill and practice on music fundamentals.
Professional Composer	495.00	47250-375	Mark of the Unicorn	Mac	With <i>Professional Composer</i> you can enter clefs, notes, chords, note ornaments—anything that would be part of a published score.
Test Preparation					
Barron's Computer Study Program for the SAT	89.95	06931-100	Barron's Educational Series	II, II+, IIe	This package consists of three disks, SAT text, verbal workbook, math workbook, and a user's manual.
Computer Preparation for the ACT	89.95	34225-050	Harcourt, Brace, Jovanovich, Inc.	II, II+, IIe, IIc	Offers students a proven study method to score high on the American College Test.
English SAT II	35.00	50500-330	Micro Lab	II+, IIe, IIc	An SAT English tutorial.
Hayden Score Improvement System for the SAT	99.95	34925-530	Hayden Software	Mac	This package for the SAT includes three modules: practice tests, math, and verbal. Designed for high school students.
Mastering the SAT	150.00	11670-300	CBS Software	II+, IIe, IIc	This program, developed with the National Association of Secondary School Principals, provides tutoring geared to the student's needs.
Math SAT I	35.00	50500-335	Micro Lab	II, II+, IIe, IIc	An SAT math tutorial.
Perfect Score: Computer Preparation for the SAT	59.95	54375-500	Mindscape, Inc.	II, II+, IIe	Written by educators and thoroughly tested in the field, this package covers all sections of the SAT.
SAT Word Attack Skills	49.00	60150-817	Peachtree Software	II, II+, IIe	A tutorial package which focuses on the skills required for mastering English vocabulary or deciphering new or unfamiliar words.
Computer Literacy					
Apple Logo	100.00	03900-050	Apple Computer, Inc.	II, II+, IIe, IIc	An exciting and popular computer language that can become an environment for learning.
Experlogo	149.95	30473-500	Expertelligence, Inc.	Mac	Experlogo is a powerful adaptation of the Logo computer language for the Macintosh.
Kids at Work	29.95	68075-432	Scholastic, Inc.	II+, IIe, IIc	This is a full-color graphics program to help students become familiar with the computer.
Kids on Keys	29.95	75300-324	Spinnaker Software	II+, IIe	<i>Kids on Keys</i> is an exciting three-part learning game using letters, numbers, and pictures to introduce kids to the computer keyboard.
Maccoach	75.00	03156-083	American Training	Mac	An interactive tutorial program that simulates the various functions of the Macintosh to instruct beginners.
Turbo Turtle	49.95	34925-820	Hayden Software	Mac	With this package, students quickly develop an intuitive understanding of the Logo computer language.
Other Basic Skills					
Braintrain	39.95	08413-100	Brainworks, Inc.	II, IIc, Mac	<i>Braintrain</i> is a memory development program that measures and improves short- and long-term memory.
Discovery Games	50.00	03900-290	Apple Computer, Inc.	II, II+, IIe	These four games encourage children to practice reading, problem solving, and motor skills.
Early Games for Young Children	34.95	75309-083	Springboard Software, Inc.	II, IIe, IIc	A collection of nine individual learning games that teach your child a variety of basic skills.
Facemaker	29.95	75300-100	Spinnaker Software	II, II+, IIe, IIc	<i>Facemaker</i> lets children create funny faces on the screen and then animate them.
Factory: Strategies in Problem Solving	55.00	77038-300	Sunburst	II, II+, IIe, IIc	The objectives of this package are to develop inductive reasoning skills and to show the importance of sequence.
Gertrude's Puzzles	44.95	43870-250	The Learning Co.	II, II+, IIe, IIc	In the animated world of Gertrude, children develop abstract thinking skills.
Kidwriter	29.95	75300-336	Spinnaker Software	II, II+, IIe	Children choose from a variety of objects to create a picture, then type in a story about the picture. Ages 6-10.
Koalapad	125.00	43162-100	Koala Technologies	II, II+, IIe, IIc	A touch tablet which connects to your Apple. You can draw with finger or stylus and see your work on the screen.
Masterpieces	39.95	34925-605	Hayden Software	Mac	Transforms any image created with <i>MacPaint</i> (or any other Macintosh program) into a unique jigsaw puzzle.
Millionaire	79.95	07970-100	Blue Chip	II+, Mac	A stock market simulation game which doubles as an educational tool for learning about investment finance.
Mastertype	39.95	95709-030	Scarborough Systems, Inc.	II+, IIe, IIc, Mac	<i>Mastertype</i> provides an entertaining way to learn to type and improve keyboard skills essential to the use of a computer.
Mr. Pixels' Cartoon Kit	39.95	54375-300	Mindscape	Apple II, II+, IIe	Children ages 8-12 can stimulate their creativity by building cartoon characters and creating cartoon features.
Muppet Learning Keys	69.95	77038-575	Sunburst	II, II+, IIe, IIc	Keyboard and software which help children learn letters, numbers, and colors with the help of the Muppets. For grades preschool-1.
Rocky's Boots	49.95	43870-500	The Learning Co.	II, II+, IIe, IIc	An animated logic machine that scores points and helps children ages 7 and up understand logic skills.
Turtle Toyland Jr.	29.95	36550-310	Human Engineered Software	II, II+, IIe	Turtle Toyland Jr. is a program designed to challenge exploration and thinking in children ages 6 and beyond.
Typing Tutor III with Letter Invaders	49.95	70387-800	Simon and Schuster	II, IIc, Mac	A fun game that's also a fast and easy way to learn touch-typing.

UP And Coming Apple

Past, Present, And Future Of Apple Computer

David D. Thornburg

Looking at the reasons behind Apple's success, our prognosticator describes where Apple Computer is going, and why.

1985 will be a year of continued shakeout and consolidation for the personal computer industry. Some companies will fail, some will survive, and a few will thrive. While it's impossible to list with any real accuracy the companies that fall into these categories, this much is certain: One of the companies that will continue to dominate the personal computer industry will be Apple Computer.

Apple is a modern fairy tale—a rags to riches story that contains many paradoxes. Apple seems to have violated every rule of the marketplace at one time or another, and to have thrived as a result. Consider:

- The Apple II computers are among the highest priced in their class, but they continue to sell well, regardless of drastic price cutting by competitors, including IBM.
- The Apple II established one of the first and longest-lasting stan-

dards for personal computers and continues to enjoy massive support, even though newer technologies have allowed other machines to offer enhanced capabilities at a lower price.

- Apple's initial attempt to upgrade the Apple II—to give more power to the user in the form of the Apple III—was generally rejected by the marketplace in favor of the older design.

- At a time when it seemed that every major computer company was rushing to establish compatibility with the IBM PC, Apple introduced a completely new technology with the Macintosh and, with only two pieces of software available at its introduction, succeeded in establishing the Mac as a new standard in personal computing.

- Apple's major competition, IBM, was apparently so enamored of the Macintosh that it devoted a two-page national newspaper ad in announcing a graphics program for the PCjr modeled after Apple's *MacPaint*.

- The Macintosh—designed for the college and business market—is enjoying unexpected and overwhelming success in the home market as well, resulting in a new generation of high-

resolution videogames being developed for this machine.

I was once told that the reason truth is stranger than fiction is because fiction has to make sense.

There is almost no environment or corner of the world that has not been touched by Apple technology. Apple computers are found in schools, businesses, and homes throughout the world.

In thinking about Apple, one must think of two companies. One is devoted to the original business, the Apple II and its offspring, and the other comprises the newer 16/32-bit line, the Lisa and Macintosh technologies. Each of these divisions has attributes which are unique, and others that are shared throughout the company. The unique attributes are technology-driven while the similarities represent a corporate culture that dictates Apple's relationship with its customers, dealers, and developers.

What's The Secret Of Apple's Success?

Let's start with Apple's relationship with its customers and outside developers. From my own experience, Apple customers are a fiercely loyal lot. Because Apple computers are generally

available only through specialty stores, Apple customers know that they'll be served by people who know something about the product. In designing new machines like the Apple IIc and the Macintosh, Apple made a point of being responsive to features that customers have requested.

Apple customers enjoy access to a massive base of software and peripherals. Many companies have elected to support the Apple product line. Because Apple realizes the importance of third-party software and peripheral companies, it has bent over backwards to facilitate the development of Apple-compatible software and peripherals through things such as the Certified Developer's program.

Apple support for developers ranges from special seminars and documentation to its active involvement with selected companies on the development of software for new Apple computers.

The impact of this support is easy to see in the marketplace. When the Macintosh appeared in January of 1984, there were only two pieces of software, *MacWrite* and *MacPaint*, available. By the end of the year, there was a full line of Macintosh software, much of which took full advantage of the computer's unique aspects. For so much high-quality software to become available in such a short time required considerable support from Apple. But it also required the enthusiastic support of the development community—something that Apple seems to have always had.

It was, as I recall, *VisiCalc*—a non-Apple product—that quickly established the Apple II as a personal productivity tool for business users. While *VisiCalc* was not the first major software product for the Apple, it *was* the product which made it clear that the personal computer was a worthwhile purchase. At that time, IBM had not entered the personal computer market, and

Apple had the field pretty much to itself.

The appearance of strong third-party products in the education and entertainment markets made the Apple II a favorite in schools and homes. Even the entry of lower-priced computers, such as the Atari 800 and the Commodore 64, both with superb graphics and sound capabilities, could not dampen Apple's market penetration. As I talked with industry leaders, I found that they share a similar view of Apple's success. Recently I talked about Apple with Trip Hawkins, the president of Electronic Arts; Chris Cerf, who works with many organizations, including Children's Television Workshop and Henson Associates (the Muppets people); and Jim Schuyler, founder of DesignWare.

Trip Hawkins suggests that Apple has had the home market laid at its doorstep, but that the company needs to work this opportunity to its advantage. According to Hawkins, it will soon narrow down to a three-way race between Apple, IBM, and Commodore.

How Can Apple Stay Ahead Of The Pack?

What should Apple do with the Apple II line to insure continued success? Jim Schuyler says that the Apple IIc, with its built-in disk drive, was a wonderful step in the right direction. "But," cautions Chris Cerf, "Apple should expand the capabilities of the IIc in sound and graphics without losing the capacity to run existing software."

As for the Macintosh, Jim Schuyler points out that it has captured the imagination of software developers. One need only look at products like *MusicWorks* (Hayden), *Helix* (Odesta), *Filevision* (Telos), or *ExperLogo* (Expertelligence) to see what a highly visual user interface and a high-speed computer can make possible. Trip Hawkins says that the Macintosh has appealed to people who would never before use a computer. He thinks that the high-resolution graphics and

the uniform user interface are particularly important. Chris Cerf agrees, pointing out that the uniform interface makes it easy for a user to learn almost any new piece of Macintosh software, regardless of its function.

When the Macintosh was introduced, there were those who said that it wouldn't sell without a color display. In fact, this hasn't been the case, largely because the resolution of the Macintosh screen is such that shaded patterns can be used in place of color to distinguish areas. But according to Jim Schuyler, color *is* of value in the educational market—a market that may be important for the Macintosh, given the large number finding their way into the home. There *are* "hooks" for color in some Macintosh software in anticipation of a color display being made available at some future date.

In fact, I would be very surprised to see a color Macintosh before 1988. The reasons are fairly easy to see. First, the high resolution of the display makes the need for color much less than it would otherwise be. And more important, Apple probably does not yet have access to any high-resolution printer technology that would keep up with a high-resolution color display. Because the printer has become such a vital part of the Macintosh system, Apple would only frustrate its customers if it provided a color display and no color printer.

What Will Happen In The Next Two Years?

Apple has a rock-solid base. The Apple II line will continue to find support, and most likely will grow and evolve even more. I wouldn't be surprised to see a battery-operated portable version of the Apple II with a built-in flat panel display screen. Given the massive software base for this computer, a fully portable

version that could be used on airplanes or at the beach would be a popular product. But such enhancements (other than the flat panel display for the Apple IIc) are unlikely in 1985. I expect that 1985 will be a year of consolidation for Apple as it prepares for the next wave of products in 1986 or 1987.

This doesn't mean that there won't be exciting new products from Apple in the interim. The Macintosh established itself as a new standard in personal computing, selling well over 250,000 units by the end of 1984. In 1985, the Macintosh and other 16/32-bit machines will undergo evolution as new products are introduced. Apple's challenge in 1985 will be in the field of communication. AppleTalk, the \$50 network system, and the LaserWriter 300 dot-per-inch off-set-quality printer are but two steps in that direction.

Steve Jobs feels that prior to 1985 the market was for computers as individual servants. In 1985 and beyond, the market will be for computers as communication tools.

This concept of computers as communicators goes far beyond the modem and the telephone hookup. I expect that new Apple products, some of which will be developed in concert with outside companies like General Electric, will make our present view of computer communications look like two tin cans connected with string. The cumbersome nature of modern data communication will vanish. Messages will be sent to people's names, not to faceless machines with cryptic addresses. It will be the function of the communication system to find the recipient and place the message in his or her mailbox. I expect that in 1985 and 1986 Apple will do much to make computer communication as easy and natural as using the telephone.

In fact, I wouldn't be surprised to see Apple engaged in a joint

venture with AT&T. Each of these companies has something to offer the other, and both have shown that they can succeed in the open marketplace.

Apple's path won't be completely smooth, though. As we saw in 1984, IBM is willing to go to extreme lengths to buy its way into the lower-end computer market. By selling a PCjr system with a color display for \$800, IBM has made it clear that it intends to get its products into people's hands. Unlike Texas Instruments, Atari, and other companies that have had financial difficulties as a result of unrealistic low pricing, IBM can sustain a loss on the PCjr as long as it wants. IBM can hold its breath until our desktops, and faces, turn its shade of blue.

Apple isn't without a response. For one thing, Apple has made it clear that it acknowledges IBM's presence in the business market. For this reason, Apple now has interface cards for the IBM PC that allow file transfer between that computer and the Macintosh, or to the Apple LaserWriter printer. By making the IBM PC compatible with the AppleTalk local area network, Apple is making its selling job easier as the Macintosh is presented to Fortune 500 companies. This acknowledgment of IBM's presence (what Steve Jobs calls "competitive coexistence") will benefit Apple in the long run, even though it may be perceived as acquiescence on Apple's part. In fact, Apple is acknowledging the needs of its users. While Apple may prefer that people didn't buy PCs, the fact is that they have, and they aren't going to discard them just to get a few Apple computers into their offices. Coexistence is healthy for everyone, especially the customer.

Apple will strive to expand its business and educational markets in 1985. It may even go so far as to create a special research organization to redefine the uses of technology in education. Should such a group be created, world-class researchers and teachers would flock to Cupertino, California, knowing that

Apple has always supported the educational community.

But What About The Home?

The home market is generally taking care of itself. For example, Apple did not anticipate the large percentage of Macs bought for home use, even though outside software developers have been quick to jump on this bandwagon. I expect that Apple will revisit the home market with new products that will make home computing a reality as it has never been before. These computer products will be used as easily as a television or a microwave oven. They may take advantage of breakthroughs in natural language interfaces, and may even accomplish some of the objectives of the Japanese Fifth Generation computers, placing the benefits of years of research in the field of artificial intelligence at the user's fingertips.

Whatever Apple does in the next two years, it will have the strong support of a large development community—people who are dedicated to making computers useful to human beings on human terms. I feel confident that, as in the past, Apple will go out of its way to help those outsiders as much as it can. For one gets the feeling that above everything else, Apple puts people, its customers, and outside developers, first.

Very few computer companies can make that statement.

David Thornburg is an Associate Editor of COMPUTE! and writes the monthly column "Computers and Society." He uses his Macintosh every day for a variety of tasks, and wrote this article (and three books) using MacWrite. His books include Picture This Too! (Addison-Wesley), a book on Apple SuperPILOT; Discovering Apple Logo (Addison-Wesley); Beyond Turtle Graphics (Addison-Wesley), a book about Apple Logo II and artificial intelligence; and 101 Ways to Use a Macintosh (Random House).

Softsearcher

Ilan Reuben

Here's a short, handy, and fast programming utility written entirely in machine language. With it, you can instantly locate key statements and phrases in your programs. It works on any Apple with at least 48K RAM and a disk drive. You can enter the utility in BASIC or through the machine language monitor.

Many BASIC programs are constructed and debugged by adding new sections and routines to existing sections and routines. As a result, programs can become long and complex. Debugging becomes a real mess when you have to sift through 2000 lines of BASIC to find a certain routine or statement.

"Softsearcher" is a machine language utility which scans any BASIC program for all references to a specified character or phrase, and tells you where each reference is—all in the blink of an eye. The machine language program itself is just over a page (256 bytes) in length, and resides at memory location 36864 (\$9000 in hexadecimal). If you know little or nothing about machine language, don't worry; you can use Softsearcher as long as you can type in a BASIC program and follow a few simple directions.

Using Softsearcher

First, let's get Softsearcher up and running. If you feel more comfortable with BASIC and would like to load the utility as a BASIC program, type in Program 1, the BASIC loader. (Softsearcher works in either DOS 3.3 or ProDOS.) It's a good idea to save it before running it, just in case you made a typing error. (Notice the checksum calculation done in line

50. This double-checks the numbers you entered for the DATA statements.) Run the program. This puts the machine language portion of the utility into memory. It remains there even after you erase the BASIC loader. Next, save the machine language portion on disk by typing:

BSAVE SEARCHER, A\$9000, L\$109

If you'd rather enter Softsearcher into the computer directly, you can use the monitor listing (Program 2) and save it as shown above. In the future (whether you created the program called "SEARCHER" with the BASIC loader or through the monitor), load the program from disk by typing:

BLOAD SEARCHER

Once you have it in memory, you must set the & vector to the start of the program. This lets you run Softsearcher every time you type the character &. From BASIC, enter:

POKE 1014,0: POKE 1015,144

or from the monitor, type:

3F6:0 90

Softsearcher should now be ready to use. Here's a sample BASIC program to show how it works. Just type this in (it's not necessary that you run it, although that won't affect Softsearcher's functions).

```
10 PRINT "THIS IS A TEST"
20 FOR A = 1 TO 10
30 PRINT A + 10
40 NEXT A
```

Suppose you want to find all the references to the variable A in the program. You would type:

& A

and the computer would respond with:

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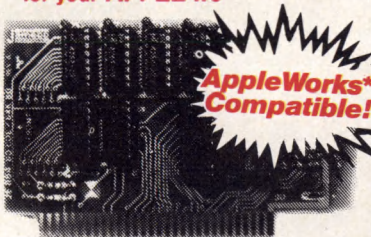
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ADD-514 (Disk Drive) \$169.95

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- Uses Chinon Pinch-type mechanics
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ADD-12. \$179.95

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JE614. \$59.95

FOUND AT LINE 10
 FOUND AT LINE 20
 FOUND AT LINE 30
 FOUND AT LINE 40

To find all the lines in which the number 10 appears, enter:

& 10

Softsearcher hunts through the program and reports:

FOUND AT LINE 20
 FOUND AT LINE 30

Notice that line 10 was not included, even though there's a 10 in its line number. Softsearcher ignores line numbers. Note, too, that if you're using Softsearcher on the Apple IIc, it will find characters in lowercase as well as in uppercase. It doesn't matter whether the search characters or phrase is in uppercase or lowercase.

Selective Searching

To specify a range of lines for Softsearcher to look through, type the # character after the &, along with the starting and ending line numbers and the phrase to search for. It could look like this:

& #20,30,PRINT

This searches lines 20 through 30 for the word PRINT. You'll see the report:

FOUND AT LINE 30

Softsearcher can be used *only in direct mode*, not in deferred mode (that is, you cannot call it from a BASIC program). If you try, the message ?NOT DEFERRED COMMAND ERROR appears.

There are some things you cannot search for. If you enter:

&&

nothing will appear, even if the & symbol was used in a PRINT statement. You also cannot search for the # symbol. If you try, you'll get a SYNTAX ERROR message.

If you'd like to have Softsearcher ready to use every time you boot your system, type in the BASIC setup routine (Program 3) and use it as a hello program when initializing disks. Just make sure that you've got the machine lan-

guage for Softsearcher saved on that disk. It must have been saved as SEARCHER. If it wasn't, make sure that you change lines 20 and 50 in Program 3 to match the new name you've given it.

Refer to "Guide To Typing In Programs" before entering these listings.

Program 1: Softsearcher (BASIC Loader)

```

10 FOR X = 36864 TO 37129
20 READ Y:CK = CK + Y
30 POKE X,Y
40 NEXT X
50 IF CK < > 36799 THEN PRINT "CHECK
   DATA STATEMENTS FOR TYPING ERRORS
   "
100 DATA 165,185,201,2,240,11,169,15,3
   2,204
110 DATA 144,32,25,237,76,60,212,32,18
   3,0
120 DATA 201,35,208,40,32,177,0,32,103
   ,221
130 DATA 32,82,231,165,80,133,8,165,81
   ,133
140 DATA 9,32,190,222,32,103,221,32,82
   ,231
150 DATA 165,80,133,10,165,81,133,11,3
   2,190
160 DATA 222,76,75,144,160,0,132,8,132
   ,9
170 DATA 136,132,10,132,11,160,255,198
   ,184,32
180 DATA 177,0,201,34,208,8,165,193,73
   ,233
190 DATA 133,193,169,34,200,153,10,145
   ,201,0
200 DATA 208,233,132,6,169,239,133,193
   ,165,8
210 DATA 133,80,165,9,133,81,32,26,214
   ,169
220 DATA 3,133,7,230,7,164,7,162,0,177
230 DATA 155,240,27,221,10,145,208,241
   ,200,232
240 DATA 228,6,208,241,169,0,32,204,14
   4,160
250 DATA 2,177,155,170,200,177,155,32,
   36,237
260 DATA 160,0,177,155,72,200,177,155,
   133,156
270 DATA 104,133,155,177,155,240,10,16
   0,3,177
280 DATA 155,197,11,240,8,144,188,169,
   141,32
290 DATA 240,253,96,136,177,155,197,10
   ,240,175

```



```

300 DATA 144,173,176,239,170,169,141,3
    2,240,253
310 DATA 189,222,144,240,6,32,240,253,
    232,208
320 DATA 245,96,198,207,213,206,196,16
    0,193,212
330 DATA 160,204,201,206,197,160,0,135
    ,191,206
340 DATA 207,212,160,196,197,198,197,2
    10,210,197
350 DATA 196,160,195,207,205,205,193,2
    06,196,160
360 DATA 197,210,210,207,210,0

```

Program 2: Softsearcher (Monitor Listing)

```

9000- A5 B9 C9 02 F0 0B A9 0F
9008- 20 CC 90 20 19 ED 4C 3C
9010- D4 20 B7 00 C9 23 D0 28
9018- 20 B1 00 20 67 DD 20 52
9020- E7 A5 50 85 08 A5 51 85
9028- 09 20 BE DE 20 67 DD 20
9030- 52 E7 A5 50 85 0A A5 51
9038- 85 0B 20 BE DE 4C 4B 90
9040- A0 00 84 08 84 09 88 84
9048- 0A 84 0B A0 FF C6 B8 20
9050- B1 00 C9 22 D0 08 A5 C1
9058- 49 E9 85 C1 A9 22 C8 99
9060- 0A 91 C9 00 D0 E9 84 06
9068- A9 EF 85 C1 A5 08 85 50
9070- A5 09 85 51 20 1A D6 A9
9078- 03 85 07 E6 07 A4 07 A2
9080- 00 B1 9B F0 1B DD 0A 91
9088- D0 F1 C8 E8 E4 06 D0 F1
9090- A9 00 20 CC 90 A0 02 B1
9098- 9B AA C8 B1 9B 20 24 ED
90A0- A0 00 B1 9B 48 C8 B1 9B
90AB- 85 9C 68 85 9B B1 9B F0
90B0- 0A A0 03 B1 9B C5 0B F0
90B8- 0B 90 BC A9 8D 20 F0 FD
90C0- 60 8B B1 9B C5 0A F0 AF
90C8- 90 AD B0 EF AA A9 8D 20
90D0- F0 FD BD DE 90 F0 06 20
90D8- F0 FD E8 D0 F5 60 C6 CF
90E0- D5 CE C4 A0 C1 D4 A0 CC
90E8- C9 CE C5 A0 00 87 BF CE
90F0- CF D4 A0 C4 C5 C6 C5 D2
90F8- D2 C5 C4 A0 C3 CF CD CD
9100- C1 CE C4 A0 C5 D2 D2 CF
9108- D2 FF

```

Program 3: Softsearcher (Hello Program)

```

10 D$ = CHR$(4): REM CTRL-D
20 PRINT D$"BLOAD SEARCHER"
30 POKE 1014,0: POKE 1015,144
40 REM ^ SET & VECTOR ^
50 PRINT "'SEARCHER' ENABLED"

```

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Standard model keypads are also available for the Apple II+*. Ask your dealer for details.

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Inside A

MacArtist

Vahé Guzelimian

The Macintosh can turn even the most inartistic into dazzling illustrators. This excerpt from COMPUTE! Books' Becoming a MacArtist shows just some of the techniques you can use to turn out impressive personal and business graphics.

Why use a computer for producing graphics when pen and ink have been adequate for hundreds of years? After all, it's a simple matter to sketch, erase, and resketch the old-fashioned way. Isn't it?

This sort of resistance to using a cold, rational machine to participate in the warm, intuitive medium of art is understandable, but no longer valid. The computer is just another tool, like a camera or a T square, that can make some aspects of creating visual art easier, faster, and even more fun.

MacPaint

MacPaint is one of the most powerful and versatile drawing programs available for microcomputers. It takes advantage of the Macintosh's sophisticated hardware to give you a quick, easy-to-use set of illustrating tools. MacPaint's large selection of drawing tools and palettes makes it simple to create all sorts of pictures. With it, you'll be able to produce beautiful and evocative visual creations.

What follows are just a few of the things, some simple, some advanced, that you can do with MacPaint.

Customizing Eraser Shapes

Have you ever wanted a small eraser so you

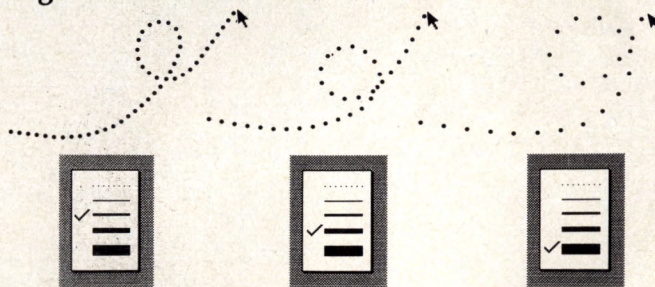
could get into narrow spaces to clean up fine details? MacPaint provides only one eraser shape—a 16 × 16 pixel square—but you can erase with something smaller if you use a white paintbrush. Double-click the paintbrush and choose the shape you want. Now select white as the pattern, and paint whatever you want to erase with white. Painting with white gives you 32 new eraser shapes.

Repeating Shapes

How would you create dotted lines with MacPaint? It's easy if you keep in mind how the lasso and multiple-copy features can interact. First, use the pencil to create one dot. Lasso the dot. Move the lasso to the dot until it turns into the pointer arrow. With the second thickness line selected, make multiple copies of the dot by holding down Option-Command while dragging the mouse.

To space the dots farther apart, select one of the thicker lines. The dot doesn't change; only the spacing changes. The thicker the line, the more distance between dots.

Figure 1: Dotted Lines



Brush Shapes

If you get tired of the 32 brush shapes MacPaint provides, you can create your own. Make a filled shape (not an outlined figure) for your brush. Turn *Grid* on and lasso the shape. To

paint, just press Option-Command while dragging it.

Working From Black

You can get some interesting effects by working from black instead of white. White on a black background can create dramatic illustrations.

To make the MacPaint window completely black, double-click the marquee tool to select the whole window. Make sure that black is the selected pattern at the bottom of the MacPaint screen and choose *Fill* from the *Edit* menu. Now use the pencil to draw in white on black. Try other tools, such as the spray can and the paintbrush, after changing the pattern to white. Experiment with various patterns for even more bizarre results.

MacPaint can even make a negative of an existing drawing. Select the entire drawing with the marquee and choose *Invert* from the *Edit* menu. Dramatic, isn't it?

Figure 2: Invert



Custom Lettering

You can design your own letterings and store them in the Scrapbook or in a MacPaint document for later use. These techniques will allow you to create large, fancy letters for your special graphics projects. Here's an example:

Figure 3: Design The Lettering



For the *Restaurant* lettering, start with New York, bold, in 36- and 72-point sizes.

Resize the letters if necessary by selecting them with the marquee, holding down Command-Shift, and dragging. To make the letters bolder, you can use *Trace Edges* repeatedly and then erase the internal lines with the paint can with white.

Figure 4: Shrink And Make Bolder



To customize the *R*, work on a copy of it which includes some of the surrounding letters. This insures that you have the original in case you make a mistake. Use the oval tool to sketch the position of the new top of the *R* as well as its scrolls.

Use *FatBits* to erase unnecessary lines and enhance the scrolls.

Figure 5: Build The Scrolls



Erase the descender of the *R*. To make it easy to create a new descender, use the paintbrush tool to draw it and then make it thin and bold by using Command-E to trace its edges. This may take several tries to get it right. If you make a mistake, press the Tilde key (on the upper left of the keyboard) to undo, and try again.

Add scrolls to the descender and enhance the vertical stroke. Clean up the ragged spots with *FatBits*. Use Shift-Command-E to trace edges with a shadow to complete the *R*.

Figure 6: Finishing The *R*



Now convert the other letters to your specifications. Put them all together to get the final result.



MacDraw is a structured graphics editor. That means it allows you to create and edit distinct forms such as rectangles, circles, and polygons. Unlike MacPaint, though, MacDraw remembers each shape you draw. This gives you the freedom to edit any shape, even if it's lying atop or beneath another, without disturbing other shapes around it.

MacDraw's features also make it an excellent tool for many visual arts applications. You can use it for product design, architectural renderings, layouts, organizational charts, flowcharts, and maps, as well as general mechanical and technical illustrations.

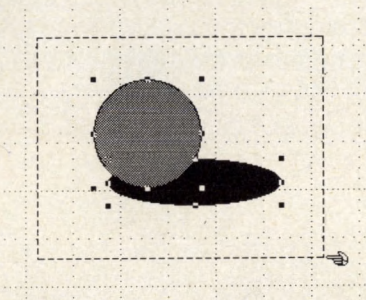
It's even possible to take items from MacDraw and paste them into MacPaint for additional modification. This way you get the best of both worlds—you can use MacDraw's specialized features to do the basic drawing and then use MacPaint's special features to put on the finishing touches.

Moving Data From MacDraw To MacPaint

On some occasions, you may want to draw something to scale in MacDraw and then enhance it with MacPaint. Since MacDraw doesn't offer tools for adding shading to create a sense of volume, for example, you could transfer your MacDraw illustration to MacPaint and then add shading with the spray-can tool. Try this example.

Copy from MacDraw. Choose a drawing from an open MacDraw document with the marquee.

Figure 7: Select From MacDraw



Choose *Copy* from the *Edit* menu to put your selection into the Clipboard.

Figure 8: Copying Into The Clipboard

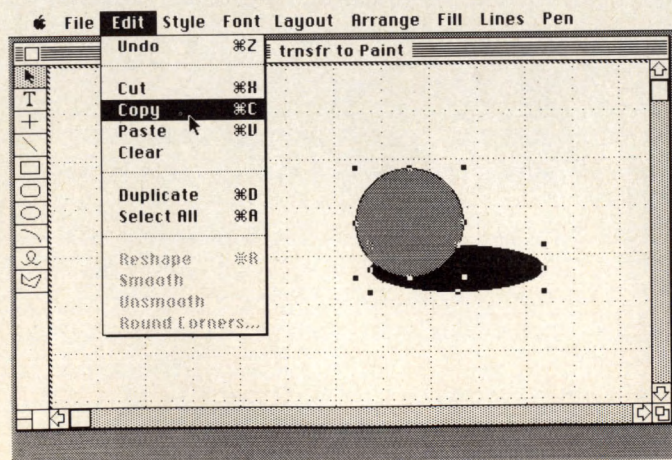
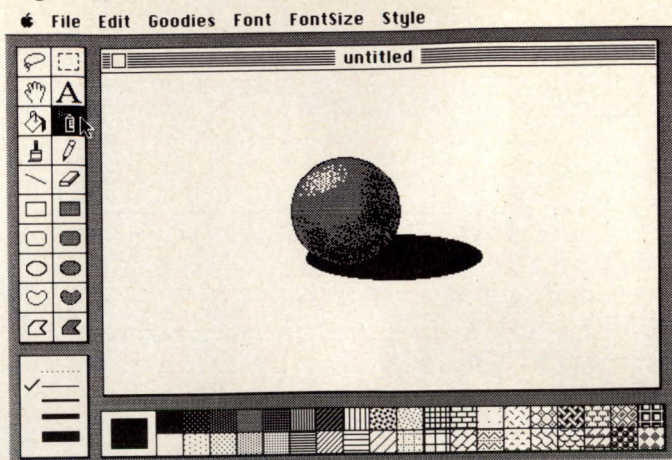


Figure 9: Enhancing With MacPaint



Open a MacPaint document. Choose *Quit* from the *File* menu to return to the desktop. Eject the MacDraw disk and insert MacPaint. Open the MacPaint window.

Paste it. Choose *Paste* from the *Edit* menu to insert the item from the Clipboard into your MacPaint document.

Touch it up. Click the spray-can icon and do the shading. See if you can get a similar effect to that shown in Figure 9. Use *FatBits*, if necessary, to clean up any stray dots.

Save it. Choose *Save As* from the *File* menu to name and record the changes as a MacPaint document.

MacWrite

Like other word processors, MacWrite saves you from tedious retyping. Instead of having to retype the entire letter, report, document, story, or even novel, all you have to do is enter the revisions. Your printer does all the rest. After using a word processor, most writers refuse to go back to a typewriter.

But MacWrite is more than a word processor. With it, you can design your own letterhead, even adding a logo with MacPaint. Once you've created the letterhead and logo, and saved it to disk, all you need to do is open the letterhead document and type in your letter.

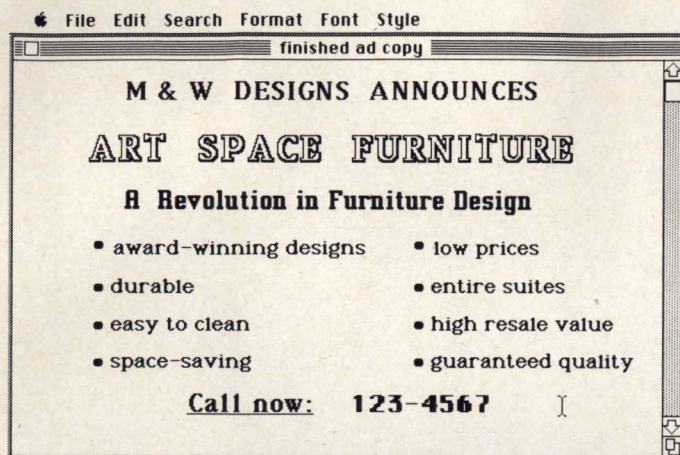
Creating Advertising Copy With MacWrite

An example can probably best show MacWrite's capabilities. If you read through the step-by-step instructions below and use your Macintosh to follow along, you'll see how to prepare the copy for a one-page advertising flyer. [Chapter 3 in *Becoming a MacArtist* demonstrates how

you can complete the flyer by combining the copy with a logo and dresser illustration—Ed.]

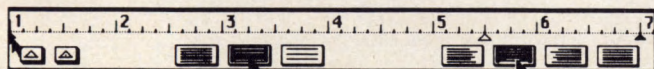
When you're through with the copy, it will look like this.

Figure 10: Finished Copy



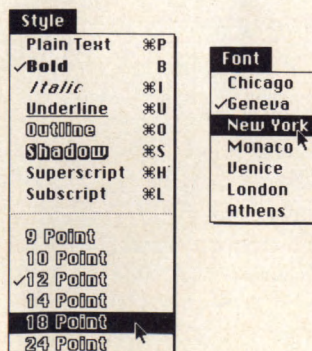
Set your format. The ruler is your formatting tool. With it, you'll set margins, tabs, line spacing, centering, and justification. Since you want centered text and 1-1/2 line spacing, click the center icon and the 1-1/2 spacing icon. Those icons are the ones highlighted in Figure 11—the center icon on the right, the spacing icon on the left. The left and right margins are to be set at 1 inch and 7 inches respectively, so drag the Left Margin and Paragraph Indentation markers to the 1-inch mark.

Figure 11: The Adjusted Ruler



Choose font type, size, and style. The first line you'll type is *M & W DESIGNS ANNOUNCES* in 18-point New York font in a bold style. Choose *New York* from the *Font* menu, and *Bold* and *18* from the *Style* menu.

Figure 12: Choosing The Text



Type the first line of text. Type the first

line and press Return. The insertion point moves to the next line at the center.

Type two more lines of text. Go ahead and type in the next two lines. The first is *ART SPACE FURNITURE*, which should be 24-point bold, with shadow, using New York font. Type *A Revolution in Furniture Design* in 18-point Athens bold.

If you make a mistake, it's easy to make corrections. Just press the Backspace key to delete the last letter you typed. To delete a word, double-click the word to select it (it becomes highlighted) and press Backspace. To erase a larger portion of text, Shift-click to highlight everything from the insertion point to your current position and press Backspace.

Insert a second ruler. Now you're ready for the two columns of listed features. You have to change the formatting for this text, so choose *Insert Ruler* from the *Format* menu. A second ruler appears at the insertion point.

Change the format. You want tabs for the two columns of text to be set at 1-3/4 inches and 4-3/4 inches. Drag a tab marker (shown as an empty triangle shape) from the well of tab markers at the left side of the screen to the 1-3/4-inch position. Then move the existing tab marker on the right to the 4-3/4-inch position. Select left justification (the leftmost icon from the group of four at the right part of the ruler), because centering is no longer required.

Text in the first column. Use the Tab key to move the insertion point to the tab marker. Choose 14-point New York in bold. Press Option-8 to get the large dot. Now press the space bar once and type *award-winning designs*, but don't press Return.

Text in the second column. Press the Tab key again to get to the second column, press Option-8, then space, and enter *low prices*. (Don't enter the period, however.) Press Return.

Complete the columns of text. Continue until you've typed in all the copy.

Insert another ruler. Now you have to change the formatting again to center the next line. Choose *Insert Ruler* from the *Format* menu and click the center icon.

Type the last line. Type *Call now:* in 18-point New York, bold and underlined. Select 18-point Chicago bold, insert two spaces, and enter 123-4567. If you entered the spaces before you chose the new type style and font, the spaces would be underlined.

Hide rulers. To see the text without the rulers, choose *Hide Rulers* from the *Format* menu. Though this erases the rulers, their effect is maintained.

Save it. Before you go any further, save this document on your MacWrite working disk. 🍏

Heat Seeker

Tim Victor, Editorial Programmer

(Original game concept and VIC-20 version by Jeff Wolvertson)

Your jet climbs upward to avoid the missile, then dives for the ground. But it's still on your tail. You can't shake a heat seeker. A fast-action, machine language game for Apple II series computers. Joystick or keyboard control.

Heat-seeking missiles are dangerous. They sense the heat from your jet engine and home in on you. They'll catch you, too—they're faster than a jet.

Your assignment: Eliminate the heat-seeker base. It's easy enough to strafe the missiles on the ground, but if any are launched, you'll have to take evasive action.

AppleMLX

"Heat Seeker" is written entirely in machine language (ML). Only with ML are such impressive graphics and speed possible. Usually, ML programs are difficult to enter. The mass of numbers which make up an ML program can seem endless, and typing them all in without a single error is almost impossible. That's why we've listed Heat Seeker in MLX format. You need to use "AppleMLX," a machine language entry program found elsewhere in this issue, to type in Heat Seeker. Before you begin entering the game, then, you'll need a copy of AppleMLX on disk.

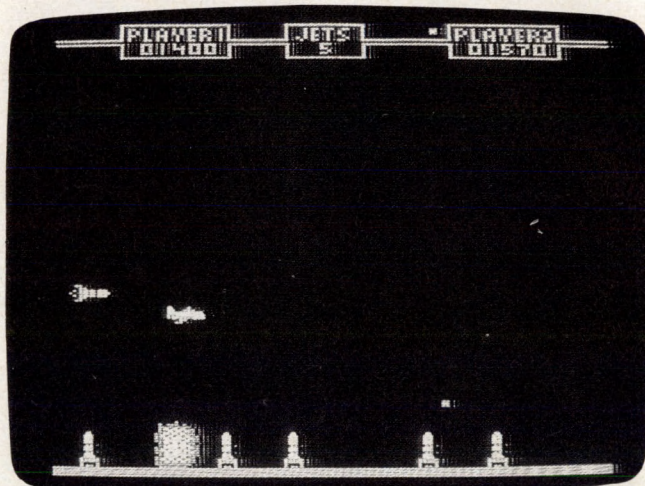
Once you have a copy of MLX, load and run it. Two prompts appear on the screen, asking for the beginning and ending address of the program you're going to type in. For Heat Seeker, those addresses are:

Beginning Address: 1000

Ending Address: 2377

Just follow the instructions outlined in the article which accompanies AppleMLX. You can type in Heat Seeker in as many sessions as you want, saving your work on disk, and returning to it later.

ProDOS Modification. If you're typing in Heat Seeker under the ProDOS operating system, you need to change one line of the program listing. Use the following line instead of what appears in the listing.



In the two-player game, the second player's jet tries to outrun another heat seeker.

1788: 10 AD 51 C0 4C 00 BE 20 60

When you've finished entering Heat Seeker, you'll have a file on disk, ready to run. If your Apple can display 80 columns of text, you *must* have it in 40-column mode before running the game. Press the Escape key, then Control-Q to enter 40-column mode.

Now type:

BRUN filename

and hit Return. The game loads and runs, and you'll see the options menu screen. Either one or two people can play Heat Seeker. The two-player mode isn't competitive—the players take turns flying the plane, trying for the highest score. You need only one joystick, even with two players.

There are three levels of difficulty: Trainer, Novice, and Ace. All you need to do is press the T, N, or A key. In the Trainer level, missiles are never launched. You can fly as much as you like without being chased, but crashes are counted against your eight-jet total. This is the perfect level to become familiar with the controls of your aircraft. Novice and Ace are actual playing levels: Ace has faster action and tighter curves. All three levels award a flight-time bonus of ten points every few seconds, just for staying in the air.

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Piloting The Jet

After you've selected your options, the game screen appears. Press the joystick fire button or the space bar to start your jet. Use the joystick or keyboard to control the movement of the plane. The controls may seem to be a little confusing at first. If you're using the joystick, pull back to loop upwards (counterclockwise) and push forward to loop down (clockwise), like a real airplane. The key controls are a bit different. The right-arrow key moves the jet downwards and the left-arrow key loops the aircraft upwards. The jet moves at a constant velocity—you can't speed up or slow down. Press either fire button on the joystick or the space bar to launch a missile at the heat seekers on the ground. It does no good to fire at a moving heat seeker. They're equipped with an Improved Electronic Evasion (IEE) circuit which makes them impossible to hit. The only way to get rid of a seeker is to make it crash into the ground. When you're being pursued, dive for the ground and pull up at the last second. Seekers are faster, but they can't turn as quickly.

Your plane can't shoot itself, so don't worry about all your shots zipping across the screen. If you manage to eliminate all the heat seekers,

you get to start all over again, with a new group of heat seekers. A bonus of 1000 points is awarded for each group you eliminate. You have eight jets to work with—the number remaining is displayed on the screen, next to the score.

After crashing, you can catch your breath for a moment. You'll notice that all eight missiles have been replaced, even though you might have destroyed several with the previous jet. When you're ready to fly again, press the joystick button or the space bar to continue.

At the end of a game (after you've crashed eight jets), you can go back to the options menu to change selections, quit the game, or play the same game configuration again. (If you're using joystick controls, pressing the button gives you another play.)

Speedy Addiction

Heat Seeker is a commercial-quality, arcade-style game. With the exception of sound (omitted because of program length), Heat Seeker has all the elements you expect from something you've paid up to \$20 for. It's fast, smooth, and graphically dazzling. More important, it's addicting.

Heat Seeker

Use AppleMLX to enter this program. If you're using ProDOS, note the one-line change mentioned in the article.

START ADDRESS: 1000
END ADDRESS: 2377

```
1000: 20 E8 1F A0 5F 99 00 81 3B
1008: 88 10 FA A0 08 A9 0A 99 6E
1010: 32 81 88 88 D0 F7 4C 8F D1
1018: 17 2C 50 C0 2C 57 C0 2C 51
1020: 52 C0 2C 54 C0 A9 00 85 96
1028: 1C 8D 40 80 8D 41 80 A9 E5
1030: 20 8D 43 80 85 E6 20 F6 33
1038: F3 A9 40 8D 42 80 85 E6 A3
1040: 20 F6 F3 20 48 15 A9 00 98
1048: A0 04 99 56 81 99 5B 81 FC
1050: 88 10 F7 8D 99 81 A9 08 BE
1058: 8D 80 81 8D 81 81 A9 01 CE
1060: 8D 31 81 A9 00 8D 6B 1D 88
1068: 8D 85 81 8D 10 C0 A2 0A 8C
1070: 9D 31 81 CA CA D0 F9 8D A3
1078: 3C 81 A9 60 8D 3D 81 A9 60
1080: 20 8D 00 81 A9 28 8D 0C 41
1088: 81 A9 75 8D 18 81 A9 00 75
1090: 8D 24 81 A9 FF A0 00 99 67
1098: 48 81 C8 C0 0E D0 F8 A9 B1
10A0: 80 8D 48 81 8D 54 81 20 66
10A8: C7 12 A9 01 A0 07 99 8F 3E
10B0: 81 88 10 FA 20 E0 1A 20 3E
10B8: 94 12 20 FE 15 AD 42 80 FF
10C0: AC 43 80 8D 43 80 8C 42 68
10C8: 80 C9 40 A9 00 2A AA 9D D9
10D0: 54 C0 20 BE 16 AD 85 81 2F
10D8: F0 F8 A9 00 8D 85 81 A9 14
10E0: 0C 8D 53 81 20 E0 1A A2 48
10E8: 07 8D 8F 81 D0 0C DE 8F 0A
10F0: 81 8E 8E 81 20 C4 1A AE 4A
10F8: 8E 81 CA 10 EC 20 AE 16 76
1100: AD 48 81 D0 03 20 87 14 04
1108: A2 03 BD 49 81 D0 03 20 FD
1110: 31 14 CA 10 F5 AD 4D 81 AC
1118: D0 03 4C 9E 14 AD 4E 81 4C
```

```
1120: D0 08 8D 33 81 A9 80 8D D2
1128: 48 81 A2 03 BD 4F 81 D0 52
1130: 08 20 31 14 A9 FF 9D 49 97
1138: 81 CA 10 F0 AD 54 81 C9 6A
1140: FF D0 08 20 D8 15 A9 80 88
1148: 8D 54 81 20 FE 15 20 80 85
1150: 1B A2 00 8E 8B 81 BD 31 A0
1158: 81 D0 03 4C ED 11 20 B6 3F
1160: 13 AD 86 81 C9 BC 90 17 D9
1168: E0 04 90 06 DE 31 81 4C 79
1170: ED 11 A9 54 9D 0C 81 A9 12
1178: 00 9D 0D 81 20 6A 13 E0 6D
1180: 04 90 03 A9 04 2C A9 0A F1
1188: 8D 8C 81 A9 00 8D 8E 81 34
1190: A9 06 8D 8D 81 AD 86 81 E4
1198: C9 AD 90 51 BD 00 81 ED 11
11A0: 8D 81 B0 07 6D 8C 81 90 A1
11A8: 44 B0 04 C9 07 B0 2B AC 34
11B0: 8E 81 B9 8F 81 C9 01 D0 B0
11B8: 34 A9 54 9D 0C 81 A9 00 7D
11C0: 9D 0D 81 20 6A 13 AC 8E AE
11C8: 81 A9 00 99 8F 81 20 C4 37
11D0: 14 20 BC 15 AE 8B 81 AC E0
11D8: ED 11 18 AD 8D 81 69 11 6A
11E0: 8D 8D 81 EE 8E 81 AD 8E 80
11E8: 81 C9 08 D0 AF E8 E8 E0 20
11F0: 0C F0 03 4C 53 11 AD 4D 02
11F8: 81 C9 FF D0 0B 20 BE 16 C7
1200: AD 85 81 F0 03 20 DF 13 07
1208: AD 33 81 F0 2A AD 4E 81 35
1210: C9 FF D0 23 20 40 1C AD 4D
1218: 44 1C C9 04 90 04 C9 FC 04
1220: 90 15 AD 45 1C C9 04 90 7C
1228: 04 C9 FC 90 0A A2 00 20 64
1230: 6A 13 AD 02 20 6A 13 AD 41
1238: 43 1C 8D 6C 1D 20 68 1D D4
1240: 20 3B 16 20 94 12 AD 42 92
1248: 80 AC 43 80 8D 43 80 8C 4F
1250: 42 80 C9 40 A9 00 2A AA 3F
```

```
1258: BD 54 C0 A2 00 A0 0A B9 03
1260: 31 81 F0 01 CA 88 88 10 45
1268: F6 A0 05 B9 4D 81 C9 FF 70
1270: F0 02 CA CA 88 10 F4 18 1A
1278: 8A 69 08 90 14 F0 12 8D 5C
1280: 89 81 A9 F0 8D 8A 81 CE 76
1288: 8A 81 D0 FB CE 89 81 D0 9C
1290: F1 4C E4 10 A2 00 BD 31 20
1298: 81 F0 03 20 A5 12 E8 E8 4C
12A0: E0 0C D0 F2 60 BD 00 81 FC
12A8: 8D 85 19 BD 0C 81 8D 86 FB
12B0: 19 BD 0D 81 8D 87 19 BD 05
12B8: 3C 81 8D 83 19 BD 3D 81 01
12C0: 8D 84 19 20 80 19 60 20 3B
12C8: EB 12 AD 42 80 AC C3 80 FE
12D0: 8D 43 80 8C 42 8C 09 40 4D
12D8: A9 00 2A AA BD 54 C0 20 A2
12E0: EB 12 A9 00 8D 40 80 8D B0
12E8: 41 80 60 20 E0 1A A9 07 A5
12F0: 8D 85 19 A9 56 8D 86 19 0A
12F8: A9 80 8D 87 19 A9 8C 8D 52
1300: 83 19 A9 60 8D 84 19 20 3A
1308: 80 19 18 AD 85 19 69 11 07
1310: 8D 85 19 C9 8C 90 F0 AD 54
1318: 42 80 09 13 85 F9 A9 80 B9
1320: 85 F8 A0 50 A9 2A 91 F8 72
1328: C8 A9 55 91 F8 C8 C0 78 C5
1330: D0 F2 A5 F9 18 69 04 85 C3
1338: F9 29 1C D0 E5 A9 03 85 97
1340: 24 A9 00 20 5B FB AD 42 4D
1348: 80 85 E6 AD 99 81 D0 03 3F
1350: A9 37 2C A9 34 20 03 15 76
1358: A9 1B 85 2A AD 99 81 D0 B4
1360: 03 A9 34 2C A9 37 20 03 29
1368: 15 60 A9 00 9D 18 81 9D 54
1370: 24 81 A9 54 DD 0C 81 B0 56
1378: 08 9D 0C 81 A9 00 9D 0D 39
1380: 81 A9 0E 9D 3C 81 A9 60 63
1388: 9D 3D 81 8A 4A 8A A9 40 2E
1390: 99 4D 81 C0 00 D0 03 8C E8
1398: 6B 1D C0 01 D0 0E A9 00 F5
13A0: 8D 43 1C 8E 8B 81 20 D4 42
13A8: 15 AE 8B 81 C0 02 90 05 C2
13B0: A9 FF 99 47 81 60 BD 3C 98
```


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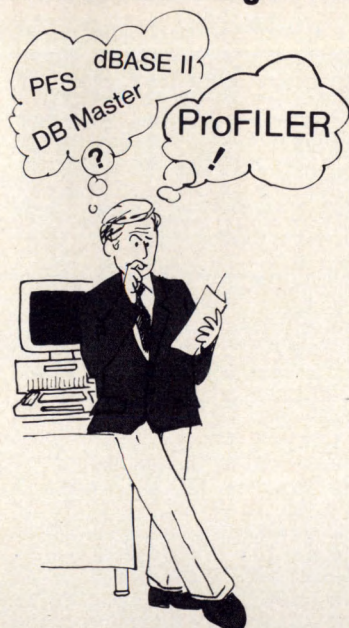
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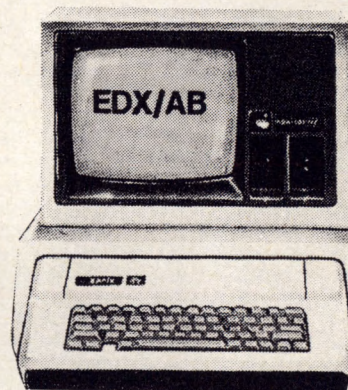
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13C0:	A0	00	B1	F8	85	FC	C8	B1	60	1660:	20	6F	16	18	69	70	8D	3E	23	1900:	C9	CC	D0	D0	C1	A0	C5	CC	5A	
13C8:	F8	85	FD	88	BD	0C	81	0A	40	1668:	81	A9	60	8D	3F	81	60	A9	0F	1908:	D0	D0	C1	A0	D3	A7	A1	C5	5F	
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13E8:	81	F0	07	E8	E8	E0	0C	90	EE	1688:	32	90	0A	E0	CE	B0	06	09	8F	1928:	B6	B0	B2	B1	B2	B1	B2	AF	C4	
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13F8:	8C	90	02	E9	8C	9D	00	81	C4	1698:	80	90	05	18	49	7F	69	09	6F	1938:	B2	B1	B2	AF	AE	A7	A5	A4	85	
1400:	AD	0C	81	69	02	9D	0C	81	E8	16A0:	8D	82	81	18	0A	6D	82	81	72	1940:	A3	22	A1	A0	AD	B4	B3	B4	67	
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1450:	20	C4	14	EE	33	81	AD	8E	B4	16F0:	01	8D	85	81	60	AD	83	81	0C	1990:	8B	19	A9	00	8D	89	19	AD	76	
1458:	81	8D	02	81	0A	0A	0A	0A	93	16F8:	F0	05	CE	83	81	F0	01	60	23	1998:	85	19	CD	8B	19	90	04	ED	47	
1460:	6D	02	81	69	07	AD	02	81	7A	1700:	A9	00	8D	6B	1D	60	AD	61	92	19A0:	8B	19	38	2E	89	19	4E	8B	A1	
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1498:	20	B8	15	4C	5E	10	AD	99	8E	1738:	60	20	FE	15	AD	43	80	C9	15	19D8:	9F	18	69	02	85	FC	C8	B1	91	
14A0:	81	AA	DE	80	81	AD	97	81	0A	1740:	20	F0	13	20	E0	1A	20	94	63	19E0:	F8	85	A0	85	FD	90	02	E6	7A	
14A8:	8D	99	81	A8	B9	80	81	D0	5C	1748:	12	A9	20	8D	43	80	A9	40	76	19E8:	FD	20	B8	1A	2C	8C	19	30	D0	
14B0:	0D	EC	99	81	F0	8B	BD	80	95	1750:	8D	42	80	AD	54	C0	20	58	FE	19F0:	05	CE	8C	19	50	0E	20	52	C9	
14B8:	81	F0	06	8E	99	81	4C	5E	51	1758:	FC	AD	53	C0	A9	15	20	5B	24	19F8:	1A	A4	9E	B1	FE	11	FC	91	18	
14C0:	10	4C	39	17	AD	8E	81	85	CC	1760:	FB	A2	4C	A0	88	20	48	18	36	1A00:	FE	88	10	F7	18	A0	01	B1	4E	
14C8:	F8	0A	0A	65	F8	69	D1	85	1E	1768:	AD	10	C0	AD	00	C0	30	0B	D2	1A08:	9F	65	FC	85	FC	90	02	E6	72	
14D0:	F8	AD	42	80	09	16	85	F9	DE	1770:	AD	61	C0	0D	62	C0	10	F3	E0	1A10:	FD	E6	A1	C6	9D	D0	D5	A9	23	
14D8:	A2	0F	A9	00	A8	91	F8	C8	91	1778:	4C	19	10	8D	10	C0	C9	D1	D6	1A18:	80	85	FF	A9	00	2C	42	80	3E	
14E0:	C0	03	D0	F9	20	EB	14	CA	87	1780:	F0	07	C9	C3	F0	09	4C	19	BB	1A20:	50	02	A9	20	85	FE	2C	42	F6	
14E8:	D0	F0	60	A5	F9	18	69	04	23	1788:	10	AD	51	C0	4C	00	E0	20	A4	1A28:	80	50	08	AD	41	80	EE	41	B7	
14F0:	85	F9	29	1C	D0	0C	A5	F8	3C	1790:	58	FC	AD	51	C0	A0	BB	A2	97	1A30:	80	10	06	AD	40	80	EE	40	66	
14F8:	69	80	85	F8	A5	F9	69	E0	FE	1798:	28	20	48	18	A9	0F	85	24	26	1A38:	80	0A	0A	A8	A5	9F	91	FE	C8	
1500:	85	F9	60	85	45	86	46	84	25	17A0:	A2	0B	20	48	18	A9	0D	85	72	1A40:	C8	A5	A0	91	FE	C8	AD	88	6E	
1508:	47	A2	1F	86	1B	0A	0A	0A	E9	17A8:	24	A9	23	20	5B	FB	A0	3C	FD	1A48:	19	91	FE	C8	AD	89	19	91	31	
1510:	18	69	28	85	1A	90	02	E6	F8	17B0:	A2	0F	20	48	18	20	53	18	7C	1A50:	FE	60	A5	A1	29	3F	A8	B9	3C	
1518:	1B	A5	28	85	08	A5	29	29	E8	17B8:	C9	B1	F0	04	C9	B2	D0	F5	47	1A58:	78	1A	0D	42	80	85	FF	A9	D8	
1520:	03	05	E6	85	09	A2	08	A0	C5	17C0:	20	F0	FD	38	E9	B1	8D	97	47	1A60:	08	25	A1	F0	02	A9	80	18	F4	
1528:	00	B1	1A	AA	24	91	08	E6	AA	17C8:	81	A9	08	85	24	A9	05	20	6D	1A68:	24	A1	10	02	69	50	50	02	68	
1530:	1A	D0	02	E6	1B	A5	09	18	E3	17D0:	5B	FB	A0	2D	A2	18	20	48	90	1A70:	69	28	6D	89	19	85	FE	60	E6	
1538:	69	04	85	09	CA	D0	E8	A5	6A	17D8:	18	20	53	18	C9	D4	F0	26	B0	1A78:	00	04	08	0C	10	14	18	1C	8C	
1540:	45	A6	46	A4	47	4C	F0	FD	15	17E0:	C9	CE	F0	1F	C9	C1	D0	F1	A0	1A80:	00	04	08	0C	10	14	18	1C	94	
1548:	A9	20	85	E6	20	57	15	A9	A0	17E8:	A0	06	8C	30	81	A0	07	8C	A6	1A88:	01	05	09	0D	11	15	19	1D	9C	
1550:	40	85	E6	20	57	15	60	A9	54	17F0:	32	81	A0	24	8C	6D	1D	A0	E3	1A90:	01	05	09	0D	11	15	19	1D	A4	
1558:	00	85	24	20	5B	FB	A2	01	7B	17F8:	1C	8C	6E	1D	A0	00	8C	98	AE	1A98:	02	06	0A	0E	12	16	1A	1E	AC	
1560:	A0	14	BD	17	19	20	03	15	6D	1800:	81	F0	1C	AD	A0	00	2C	A0	81	AD	1A00:	02	06	0A	0E	12	16	1A	1E	BA
1568:	BD	19	19	20	03	15	88	D0	2B	1808:	8C	98	81	A0	05	8C	30	81	1B	1A08:	03	07	0B	0F	13	17	1B	1F	BC	
1570:	F1	CA	10	EC	A9	04	85	24	A3	1810:	A0	06	8C	32	81	A0	18	8C	12	1A10:	03	07	0B	0F	13	17	1B	1F	C4	
1578:	A9	00	20	5B	FB	A0	42	A2	BA	1818:	6D	1D	A0	17	8C	6E	1D	20	44	1A18:	03	07	0B	0F	13	17	1B	1F	BC	
1580:	13	20	AD	15	AD	97	81	F0	03	1820:	F0	FD	A9	0A	85	24	A9	07	35	1A20:	01	05	09	0D	11	15	19	1D	9C	
1588:	07	A0	2F	A2	0E	20	AD	15	CF	1828:	20																			

1B98:	1B	BD	01	81	6D	87	1B	9D	DF	1E38:	4C	47	1E	4C	A1	1E	53	20	41	20D8:	FC	90	02	E6	FD	4C	0F	20	C9
1BA0:	01	81	BD	00	81	6D	88	1B	5D	1E40:	20	45	20	20	4E	4E	53	20	56	20E0:	60	07	83	83	88	80	87	AA	BB
1BA8:	C9	8C	90	0B	2C	88	1B	30	93	1E48:	BF	1E	AC	3E	1E	B1	FC	8D	A4	20E8:	80	FF	FF	87	F5	FF	8F	DD	8E
1BB0:	04	E9	8C	90	02	69	8B	9D	6A	1E50:	00	82	A9	00	8D	01	B2	A9	81	20F0:	EA	8F	C0	82	80	D0	80	80	93
1BB8:	00	81	BD	30	81	8D	86	1B	74	1E58:	01	8D	45	1E	A9	00	AE	45	F2	20F8:	0D	83	80	80	87	80	E0	87	40
1BC0:	BD	24	81	20	83	1B	18	BD	87	1E60:	1E	9D	01	82	BD	3E	1E	A8	27	2100:	80	F0	83	80	F8	81	D0	FE	A5
1BC8:	0D	81	6D	87	1B	9D	0D	81	F6	1E68:	B1	FC	AC	45	1E	0A	10	03	E2	2108:	80	D0	AE	80	C0	AF	80	C0	23
1BD0:	BD	0C	81	6D	88	1B	C9	60	94	1E70:	38	29	7F	3E	01	82	88	0D	DA	2110:	AB	80	E0	AB	80	F4	AB	80	CE
1BD8:	90	0B	2C	88	1B	10	04	A9	F2	1E78:	F4	1D	00	82	9D	00	82	EE	7F	2118:	DE	A0	80	DC	80	F0	D0	80	F7
1BE0:	00	F0	02	A9	5F	9D	0C	81	39	1E80:	45	1E	E0	04	D0	D6	A0	05	6B	2120:	80	10	82	E0	80	F0	81	F0	C0
1BE8:	E8	E8	E0	0C	F0	03	4C	8C	63	1E88:	B9	00	82	91	F8	91	FA	88	97	2128:	81	F0	81	F0	81	F0	81	F4	6E
1BF0:	1B	60	8D	87	1B	8D	89	1B	34	1E90:	10	F6	20	DE	1E	AC	46	1E	D2	2130:	83	F4	8B	F5	AB	F5	AB	F0	BF
1BF8:	30	03	A9	00	2C	A9	FF	8D	D2	1E98:	C8	8C	46	1E	C0	05	D0	AA	6D	2138:	81	F0	81	F0	81	F4	82	F4	90
1C00:	88	1B	A0	00	88	0E	86	1B	7C	1EA0:	60	20	BF	1E	AC	3E	1E	B1	3B	2140:	8A	E0	80	0E	03	8E	80	80	C4
1C08:	90	FA	C0	00	F0	25	0E	87	1F	1EAB:	FC	0A	AA	00	91	F8	91	FA	88	2148:	9E	80	80	BE	80	80	FC	80	76
1C10:	1B	2E	88	1B	0E	86	1B	90	75	1EB0:	20	DE	1E	AC	46	1E	C8	8C	0C	2150:	80	F8	82	80	F0	AB	80	F0	91
1C18:	17	18	AD	87	1B	6D	89	1B	CC	1EB8:	46	1E	C0	05	D0	E6	60	A9	94	2158:	AB	81	D0	8F	80	94	9F	80	F9
1C20:	8D	87	1B	90	03	EE	88	1B	6D	1EC0:	00	8D	46	1E	A9	F5	85	FC	38	2160:	94	BE	80	80	BC	81	80	88	5A
1C28:	AD	89	1B	10	03	CE	88	1B	7D	1EC8:	A9	1E	85	FD	AD	43	1E	09	B1	2168:	80	80	FA	80	80	80	80	07	41
1C30:	88	D0	DB	60	49	4E	45	23	93	1ED0:	80	85	F8	85	FA	A9	24	85	72	2170:	83	80	A0	81	80	AB	80	FE	67
1C38:	20	00	20	3C	4C	49	4E	45	B1	1ED8:	F9	A9	44	85	FB	60	18	A5	94	2178:	AA	97	FE	FF	95	FC	FF	9F	16
1C40:	4C	4A	1C	20	20	20	20	20	5E	1EE0:	F9	A9	44	85	F9	49	60	85	88	2180:	C0	8A	9C	80	82	98	D0	83	75
1C48:	20	20	AD	00	81	38	ED	02	19	1EE8:	FB	A5	FC	18	69	0A	85	FC	29	2188:	80	AB	80	80	EB	81	90	EB	A4
1C50:	81	90	02	18	24	38	6A	8D	93	1EF0:	90	02	E6	FD	60	2A	08	0A	78	2190:	83	D0	BE	81	D0	9E	80	D0	88
1C58:	44	1C	AD	0C	81	38	ED	0E	07	1EF8:	0A	02	2A	02	2A	2A	2A	22	90	2198:	8E	80	D0	8F	80	D0	AB	80	74
1C60:	81	90	02	18	24	38	6A	8D	A3	1F00:	08	20	20	22	02	02	20	22	EA	21A0:	F8	AB	80	FC	80	80	BE	80	2E
1C68:	45	1C	AD	44	1C	30	08	C9	BF	1F08:	22	22	08	08	08	2A	0A	2A	88	21A8:	80	9F	80	80	87	80	80	10	7A
1C70:	24	90	0D	E9	46	90	06	C9	69	1F10:	08	2A	2A	22	08	02	20	20	EC	21B0:	82	C0	81	D4	80	D0	88	E0	79
1C78:	DE	80	05	69	46	8D	44	1C	90	1F18:	20	22	08	22	20	2A	08	2A	F5	21B8:	83	E0	83	E0	83	F5	AB	F5	84
1C80:	A9	00	2C	26	81	30	09	2C	80	1F20:	0A	20	0A	2A	08	2A	20	1F	97	21C0:	AB	F4	8B	F0	8B	E0	83	E0	5E
1C88:	1A	81	10	0E	A9	01	D0	0A	0E	1F28:	AA	80	8A	A2	A2	8A	82	82	1E	21C8:	83	E0	83	E0	83	E0	83	C0	EA
1C90:	2C	1A	81	0E	A9	02	2C	85		1F30:	D5	80	84	84	84	84	84	94	26	21D0:	81	0E	82	8C	80	DE	80	9C	8D
1C98:	A9	03	8D	48	1C	A9	00	2C	50	1F38:	AA	80	88	A2	A2	AA	A2	A2	CE	21D8:	80	BD	80	FC	AB	F8	A9	F0	18
1CA0:	45	1C	30	09	2C	44	1C	10	D3	1F40:	D5	80	C4	C4	C4	90	90	90	88	21E0:	8B	D5	8F	D4	8F	C0	9E	80	DA
1CA8:	0E	A9	01	D0	0A	2C	44	1C	25	1F48:	AA	80	AB	88	88	AB	88	AB	3A	21E8:	BE	80	FC	80	F8	80	F0	07	05
1CB0:	10	03	A9	02	2C	A9	03	8D	A2	1F50:	D5	80	94	C4	C4	94	C4	C4	3F	21F0:	83	D0	80	80	C0	82	80	C8	1B
1CB8:	49	1C	AD	49	1C	38	ED	48	CC	1F58:	AA	80	A0	A0	A0	A0	A0	A0	93	21F8:	F6	BE	C2	F6	FE	C8	F6	BE	F5
1CC0:	1C	4A	90	0C	29	01	D0	02	5D	1F60:	AA	80	88	A0	A0	AB	88	AB	90	2200:	C0	82	80	D0	80	80	0F	83	0A
1CC8:	A9	FF	8D	43	1C	4C	66	1D	B7	1F68:	AA	80	80	80	80	80	80	80	EB	2208:	80	C0	83	80	E0	83	80	F0	3C
1CD0:	F0	12	A9	00	38	ED	44	1C	59	1F70:	D5	80	D1	91	91	D1	91	D0	D4	2210:	83	80	F0	81	80	D4	80	80	45
1CD8:	8D	44	1C	A9	00	38	ED	45	09	1F78:	AA	80	AB	A0	A0	A0	A0	A0	B4	2218:	9C	80	80	95	80	C0	87	80	CA
1CE0:	1C	8D	45	1C	A9	00	8D	46	A3	1F80:	D5	80	C1	90	90	C0	80	D0	64	2220:	F4	87	80	D4	83	80	D1	82	62
1CE8:	1C	8D	47	1C	AD	44	1C	0D	01	1F88:	AA	80	82	80	80	80	82	80	20	2228:	80	C9	82	80	AB	82	80	C8	90
1CF0:	45	1C	D0	06	8D	43	1C	4C	4B	1F90:	D0	90	90	90	90	90	90	95	F3	2230:	80	80	C0	80	80	10	82	98	D6
1CF8:	66	1D	AD	46	1C	18	6D	44	26	1F98:	85	84	84	84	84	84	84	D4	A7	2238:	80	BC	80	BC	80	BC	80	BC	7C
1D00:	1C	8D	46	1C	AD	47	1C	18	11	1FA0:	00	2A	20	20	20	20	20	51		2240:	80	AB	80	BC	80	BC	80	AB	6B
1D08:	6D	45	1C	8D	47	1C	AD	46	F2	1FA8:	00	28	08	08	08	08	08	0A	EC	2248:	80	BC	80	FC	80	D5	82	D5	12
1D10:	1C	38	ED	1A	81	4D	1A	81	BC	1FB0:	00	00	00	00	00	00	00	2A	19	2250:	82	81	82	A9	82	AB	80	0F	E7
1D18:	10	0E	AD	47	1C	38	ED	26	CB	1FB8:	00	00	00	00	00	00	00	55	4C	2258:	83	8E	80	80	9E	80	80	BE	D0
1D20:	81	4D	26	81	30	D4	10	1B	5B	1FC0:	80	80	80	80	80	80	80	D5	54	2260:	80	80	BC	80	80	AB	81	80	CE
1D28:	AD	47	1C	38	ED	26	81	4D	6A	1FC8:	80	80	80	80	80	80	80	AA	31	2268:	E0	81	80	A0	85	80	80	8F	56
1D30:	26	81	30	0C	AC	48	1C	CC	30	1FD0:	00	2A	00	00	00	00	00	00	99	2270:	80	80	BF	81	80	AE	81	80	67
1D38:	49	1C	D0	04	A9	00	F0	23	CA	1FD8:	00	55	00	00	00	00	00	00	6C	2278:	AA	84	80	CA	84	80	D2	80	3C
1D40:	A9	01	2C	A9	00	2C	44	1C	05	1FE0:	80	80	94	9C	94	80	80	AA	2E	2280:	80	C8	80	80	80	80	07	83	27
1D48:	10	02	49	01	2C	45	1C	10	03	1FEB:	4C	F2	1F	00	00	00	00	41	2F	2288:	80	80	85	80	AA	81	BE	87	26
1D50:	02	49	01	AC	48	1C	CC	49	5E	1FF0:	31	20	A9	12	8D	EE	1F	A9	36	2290:	89	BF	B7	A1	BE	B7	89	80	03
1D58:	1C	F0	02	49	01	09	00	D0	AE	1FF8:	00	85	FE	A9	60	85	FF	A9	D5	2298:	A0	81	80	80	85	0F	83	80	95
1D60:	02	A9	FF	8D	43	1C	60	00	2A	2000:	FC	85	FC	A9	60	85	FD	A9	19	22A0:	88	80	80	C8	80	80	D2	80	12
1D68:	4C	72	1D	20</																									

AppleMLX

Machine Language Entry Program

Tim Victor, Editorial Programmer

Machine language programs are difficult to enter into your computer. To make this chore easier and to eliminate typing mistakes, Apple Applications presents a machine language entry program for the Apple II, II+, IIe, and IIC computers, using either DOS 3.3 or ProDOS operating system.

A machine language program is usually listed as a long series of numbers. It's hard to keep your place and even harder to avoid making mistakes as you type one in, since an incorrect line looks almost the same as a correct one. To reduce the problems associated with typing in machine language programs, we've presented them as MLX listings which can be entered using the "AppleMLX" editor.

AppleMLX checks your typing on a line-by-line basis. It won't let you enter inappropriate characters and it won't let you continue if there's a mistake in a line or even if you're trying to enter a line out of sequence. You don't have to know anything about machine language to use it. In other words, AppleMLX makes machine language program entry almost foolproof.

Hexadecimal

You may notice that the AppleMLX listing in this issue (for the arcade game "Heat Seeker") contains both letters and numerals. This is hexadecimal notation, which is a special way of representing numeric values. One hexadecimal digit represents four binary digits, or bits, and two hexadecimal digits can handle one byte (eight bits). Since three decimal digits are needed to express a byte, hexadecimal notation saves you quite a bit of typing, as well as making the listings more readable.

If you're still confused about hexadecimal numbers, don't worry. You don't need to understand hexadecimal to use AppleMLX. Just type in each line as it's printed, and AppleMLX will take care of the details for you.

Using AppleMLX

Type in and save AppleMLX to disk (you'll want to use it in the future). It doesn't matter whether

you type it in on a disk formatted for DOS 3.3 or ProDOS. Programs entered with AppleMLX, however, must be saved to a disk formatted with the same operating system as AppleMLX itself.

If you have an Apple IIe or IIC, make sure that the key marked *caps lock* is in the down position. Type RUN. You'll be asked for the starting and ending addresses of the machine language program. These values are given at the beginning of the machine language program listing, as well as in the program's accompanying article. Find them and type them in.

The next thing you'll see is a menu asking you to select a function. The first is (E)NTER DATA. If you're just starting to type in a program, pick this. Press the E key, and the program asks for the address where you want to begin entering data. Type the first number in the first line of the program listing if you're just starting, or the line number where you left off if you've already typed in part of a program. Hit the Return key and begin entering the data.

Once you're in Enter mode, AppleMLX will print the address for each program line for you. You then type in all nine numbers on that line, beginning with the first two-digit number after the colon (:). Each line represents eight bytes and a checksum. When you enter a line and hit Return, AppleMLX recalculates the checksum from the eight bytes and the address. If you enter more or less than nine numbers, or the checksum doesn't exactly match, AppleMLX erases the line you just entered and prompts you again for the same line.

AppleMLX is fairly flexible about how you type in the numbers. You can put extra spaces between numbers or leave the spaces out entirely, compressing a line into 18 keypresses. Be careful not to put a space between two digits in the middle of a number. AppleMLX will read two single-digit numbers instead of one two-digit number (F 6 means F and 6, not F6).

You can't enter an inappropriate character with AppleMLX. Only the numerals 0-9 and the letters A-F can be typed in. If you press any other key (with some exceptions noted below), nothing happens. This safeguards against

entering extraneous characters. Even better, AppleMLX checks for transposed characters. If you're supposed to type in A0 and instead enter 0A, AppleMLX will catch your mistake.

AppleMLX also checks to make sure you're typing in the right line. The address (the number to the left of the colon) is part of the checksum recalculation. If you accidentally skip a line and try to enter incorrect values, AppleMLX won't let you continue. Just make sure you enter the correct starting address; if you don't, you won't be able to enter any of the following lines. AppleMLX will stop you.

Editing Features

AppleMLX also includes some editing features. The left- and right-arrow keys allow you to back up and go forward on the line that you are entering, so that you can retype data. Pressing the Control key and the D key at the same time (Control-D, for *delete*) removes the character under the cursor, shortening the line by one character. Pressing the Control key and the I key simultaneously (Control-I, for *insert*) puts a space under the cursor and shifts the rest of the line to the right, making the line one character longer. If the cursor is at the right end of the line, neither Control-D nor Control-I has any effect.

When you've entered the entire listing (up to the ending address that you specified earlier), AppleMLX automatically leaves Enter mode and redisplay the functions menu. If you want to leave Enter mode before then, press the Return key when AppleMLX prompts you with the address of a new line.

Display Data

The second menu choice, (D)DISPLAY DATA, examines memory and shows the contents in the same format as the program listing. You can use it to check your work or to see how far you've gotten. When you press the D key, AppleMLX asks you for a starting address. Type in the address of the first line that you want to see and hit Return. AppleMLX displays program lines until you press any key or until it reaches the end of the program.

Save And Load

Two menu selections are provided to let you save programs to disk and to load them back into the computer. These are (S)AVE FILE and (L)OAD FILE. AppleMLX asks you for the name of the file which contains the program. The first time you save a machine language program, there won't be a file on the disk containing the program. Whatever name you type in will be the

name of a new file that's created. If the disk doesn't have a file that you requested to load, you'll see a message stating that a disk error has occurred.

If you're not sure why a disk error has occurred, check the disk drive. Make sure that there's a formatted disk in the drive and that it was formatted by the same operating system that you're using for AppleMLX (ProDOS or DOS 3.3). If you're trying to save a file and see an error message, the disk might be full. Either save the file on another disk or quit AppleMLX (by pressing the Q key), delete an old file or two, then run AppleMLX again.

AppleMLX: Machine Language Entry Program

```

100 N = 9: HOME : NORMAL : PRINT
    "APPLE MLX": POKE 34,2: ONERR
    GOTO 610
110 VTAB 1: HTAB 20: PRINT "STA
    RT ADDRESS";: GOSUB 530: IF
    A = 0 THEN PRINT CHR$ (7):
    GOTO 110
120 S = A
130 VTAB 2: HTAB 20: PRINT "END
    ADDRESS ";: GOSUB 530: IF
    S > = A OR A = 0 THEN PRINT
    CHR$ (7): GOTO 130
140 E = A
150 PRINT : PRINT "CHOOSE:(E)NT
    ER DATA";: HTAB 22: PRINT "(
    D)ISPLAY DATA": HTAB 8: PRINT
    "(L)OAD FILE (S)AVE FILE (
    Q)UIT": PRINT
160 GET A$: FOR I = 1 TO 5: IF
    A$ < > MID$ ("EDLSQ",I,1) THEN
    NEXT : GOTO 160
170 ON I GOTO 270,220,180,200: POKE
    34,0: END
180 INPUT "FILENAME: ";A$: IF A
    $ < > "" THEN PRINT CHR$
    (4);"BLOAD";A$;","A";S
190 GOTO 150
200 INPUT "FILENAME: ";A$: IF A
    $ < > "" THEN PRINT CHR$
    (4);"BSAVE";A$;","A";S;","L";E - S
210 GOTO 150
220 GOSUB 590: IF B = 0 THEN 150
230 FOR B = B TO E STEP 8:L = 4
    :A = B: GOSUB 580: PRINT A$;
    ":";:L = 2
240 FOR F = 0 TO 7:V(F + 1) = PEEK
    (B + F): NEXT : GOSUB 560:V(
    9) = C
250 FOR F = 1 TO N:A = V(F): GOSUB
    580: PRINT A$" ";: NEXT : PRINT
    : IF PEEK (49152) < 128 THEN
    NEXT
260 POKE 49168,0: GOTO 150
270 GOSUB 590: IF B = 0 THEN 150
280 FOR B = B TO E STEP 8
290 HTAB 1:A = B:L = 4: GOSUB 5
    80: PRINT A$;":";: CALL 646
    68:A$ = ":"P = 0: GOSUB 330:
    IF L = 0 THEN 150
300 GOSUB 470: IF F < > N THEN
    PRINT CHR$ (7);: GOTO 290

```


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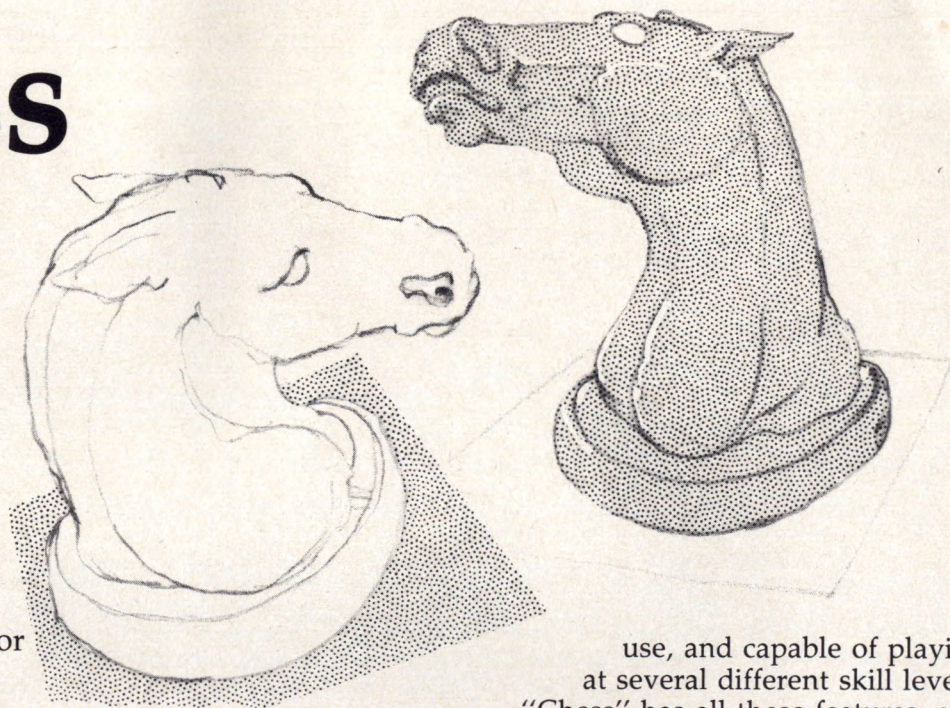
name _____
address _____
city/st _____
VISA/MC _____ exp _____



```

310 IF N = 9 THEN GOSUB 560: IF
    C < > V(9) THEN PRINT CHR$
    (7);: GOTO 290
320 FOR F = 1 TO 8: POKE B + F -
    1,V(F): NEXT : PRINT : NEXT
    : GOTO 150
330 IF LEN (A$) = 33 THEN A$ =
    0$:P = 0: PRINT CHR$ (7);
340 L = LEN (A$):0$ = A$:0 = P:
    L$ = "": IF P > 0 THEN L$ =
    LEFT$ (A$,P)
350 R$ = "": IF P < L - 1 THEN R
    $ = RIGHT$ (A$,L - P - 1)
360 HTAB 7: PRINT L$;: FLASH : IF
    P < L THEN PRINT MID$ (A$,
    P + 1,1);: NORMAL : PRINT R$;
370 PRINT " ";: NORMAL
380 K = PEEK (49152): IF K < 12
    8 THEN 380
390 POKE 49168,0:K = K - 128
400 IF K = 13 THEN HTAB 7: PRINT
    A$;" ";: RETURN
410 IF K = 32 OR K > 47 AND K <
    58 OR K > 64 AND K < 71 THEN
    A$ = L$ + CHR$ (K) + R$:P =
    P + 1
420 IF K = 4 THEN A$ = L$ + R$
430 IF K = 9 THEN A$ = L$ + " "
    + MID$ (A$,P + 1,1) + R$
440 IF K = 8 THEN P = P - (P > 0)
450 IF K = 21 THEN P = P + (P < L)
460 GOTO 330
470 F = 1:D = 0: FOR P = 1 TO LEN
    (A$):C$ = MID$ (A$,P,1): IF
    F > N AND C$ < > " " THEN RETURN
480 IF C$ < > " " THEN GOSUB
    520:V(F) = J + 16 * (D = 1) *
    V(F):D = D + 1
490 IF D > 0 AND C$ = " " OR D =
    2 THEN D = 0:F = F + 1
500 NEXT : IF D = 0 THEN F = F - 1
510 RETURN
520 J = ASC (C$):J = J - 48 - 7
    * (J > 64): RETURN
530 A = 0: INPUT A$:A$ = LEFT$
    (A$,4): IF LEN (A$) = 0 THEN
    RETURN
540 FOR P = 1 TO LEN (A$):C$ =
    MID$ (A$,P,1): IF C$ < "0" OR
    C$ > "9" AND C$ < "A" OR C$ >
    "Z" THEN A = 0: RETURN
550 GOSUB 520:A = A * 16 + J: NEXT
    : RETURN
560 C = INT (B / 256):C = B - 2
    54 * C - 255 * (C > 127):C =
    C - 255 * (C > 255)
570 FOR F = 1 TO 8:C = C * 2 -
    255 * (C > 127) + V(F):C = C
    - 255 * (C > 255): NEXT : RETURN
580 I = FRE (0):A$ = "": FOR I =
    1 TO L:T = INT (A / 16):A$ =
    MID$ ("0123456789ABCDEF",A -
    16 * T + 1,1) + A$:A = T: NEXT
    : RETURN
590 PRINT "FROM ADDRESS ";: GOSUB
    530: IF S > A OR E < A OR A =
    0 THEN B = 0: RETURN
600 B = S + 8 * INT ((A - S) /
    8): RETURN
610 PRINT "DISK ERROR": GOTO 150
    
```


Chess



John Krause
Assistant Technical Editor

This impressive chess game is not only fast, but includes five levels of play. Play the computer, let the computer play itself, or use the game to solve difficult chess problems. For Apple II+, IIe, and IIfx computers with at least 48K RAM and a disk drive.

The world was amazed, in the late eighteenth century, by a machine that had the astonishing ability to play a good game of chess. It entertained kings and queens. It defeated Napoleon, a master tactician. Hundreds of people paid to compete against it. Eventually, however, it was revealed that a small man was hidden inside the machine.

A chess-playing machine remained only a dream until the late 1950s when the first computer chess game was played. Now, the World Computer Championship, held every three years since 1974, attracts almost as much publicity as the human championship matches. Why has there been so much interest in machines that play games?

One reason is that chess can be used to measure a computer's intelligence. Chess is easy to play, but difficult to master. So difficult, in fact, that some experts believe that a computer would have to be almost as intelligent as a human to become world champion.

Of course, another reason is that chess is just plain fun—but not if you can't find an opponent. To be an entertaining opponent, a computer chess game should be fast, easy to

use, and capable of playing at several different skill levels.

"Chess" has all these features, and more. Although it's really no match against the best commercial chess games, it *has* managed to defeat these giants of the microcomputer chess world on rare occasions.

Typing It In

Chess is a machine language program. That's what gives it its power and speed. Fortunately, you don't have to know machine language to type it in. The program uses BASIC DATA statements to load the machine language into your Apple's memory. If you've entered a BASIC program before, you won't have any trouble with Chess. If this is your first attempt at typing in a program from a magazine listing, read through "Guide To Typing In Programs," an article found elsewhere in this issue, before you start.

Once you've typed in Chess, save it to disk. *Do not run the program before saving it.* If you do, and you've made a typing mistake, there's a chance the program will lock up the computer. The keyboard won't respond, and you'll have to turn the computer off and on to regain control. All your work will have been lost.

Load and run Chess and you're ready to begin.

Keyboard Input

After running the program, you'll be asked to specify several play options. You can choose among five skill levels; start a new game or set up any position; play against the computer or

watch it play against itself; or play either the white or black pieces. All of these options will be discussed in greater detail later, but for now, just type 1 at each prompt. This puts you in command of the white pieces versus the computer on level 1, the easiest level.

The first time the program is run, you need to wait a few seconds while the computer gets its brain in order. Then the board will be displayed with your pieces on the bottom of the screen and the computer's pieces on the top. The square in the lower-left corner of the board should be blinking. This is the cursor which takes the place of your hand to move pieces around the board.

Use the A, D, W, and S keys to move the blinking square left, right, up, or down. Place the cursor square atop the piece you wish to move and press RETURN. Now maneuver the cursor to the square you want to move the piece to and hit RETURN again. Your piece appears in the new position, and the computer responds almost instantly with its move.

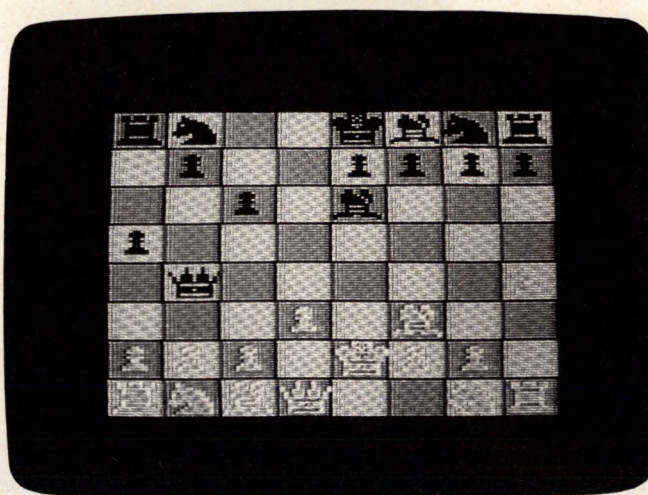
A Spectacular Blunder

Did you make a foolish move? No problem. One of the most valuable features of Chess is its ability to change piece positions by adding or deleting pieces. This feature is especially useful for those of us who frequently manage to maneuver into a superior position, only to throw it all away in a single, spectacular blunder.

A piece can be deleted by positioning the cursor on it and pressing the space bar. To add a piece or change a piece to a different one, move the cursor to the appropriate square and press P, N, B, R, Q, or K for pawn, knight, bishop, rook, queen, or king, respectively. This puts one of *your* pieces on the square. To add one of the computer's pieces, hold down the CONTROL key while pressing one of these editing keys.

To take back a move, use the editing keys to delete your piece and put it back on its original square. Don't forget to take back the computer's move, too.

The editing feature also enables you to make special moves which cannot be made with the keyboard alone, such as castling and *en passant* captures. For example, castling can be accomplished by deleting the king and putting it on its new square, and then moving the rook as you normally would with the keys. Although *you* can make these special moves, the computer will never castle or capture *en passant* because, due to their complexity, these moves were not included in its thinking routine.



Black on the attack in a computer versus computer game.

Strange Chess

Although the computer always makes a legal move, it doesn't check to see that you do the same. You're free to move any of your pieces to any square without so much as a contemptuous beep from the computer. If you're an experienced player, this shouldn't be a problem. If you're a beginner, however, you may want to familiarize yourself with the basic rules of chess lest you end up playing strange chess, a personal version which bears little resemblance to the real thing. On the other hand, if you like to fudge a bit, the computer makes it easy. It politely acquiesces to your most surreal moves.

When a pawn reaches the other side of the board, it's automatically promoted to a queen. If you would rather have a knight, bishop, or rook, you can easily make the change using the editing keys.

Checkmate

The computer thinks by analyzing thousands of possible moves and countermoves and choosing what it considers to be the best move based on the relative value of the pieces (see "How 'Chess' Thinks"). Most positions don't have just one best move, but several which are equally good, in which case the computer chooses among them at random. This random factor insures that every game is different, and makes for varied and interesting play.

Play continues until one side is either checkmated or stalemated. The computer then stops play and indicates which side has won.

There are a few quirks in the way the computer determines whether checkmate has occurred. On levels 3-5, it announces checkmate prematurely. When this happens, the computer has determined that it's impossible to avoid

checkmate on the *next* move or two, assuming both sides make the best moves.

Also, the computer doesn't know the subtle difference between checkmate and stalemate. Consequently, when stalemate occurs, it announces checkmate although, in fact, the game is a draw. Since the computer tries as hard as it can to checkmate its opponent, it also tries to achieve stalemate, possibly forcing a draw when it could have won. Fortunately, this rarely happens because the conditions for stalemate exist only in unusual circumstances such as when one side has only the king remaining.

Also, the computer won't give you any hint when your king is in check (not checkmate). So be extra careful that you don't leave your king in check or move into check. Otherwise, your king would be in check during the computer's turn to move—a highly unorthodox if not illegal position. The computer's reply to such a position is unpredictable, but it usually announces checkmate, forcing you to restart the game.

In any case, when the computer announces checkmate, press any key to start a new game. If you want to try out some of the other play options without waiting till checkmate, you can start a new game at any time by pressing CONTROL-RESET and rerunning the program.

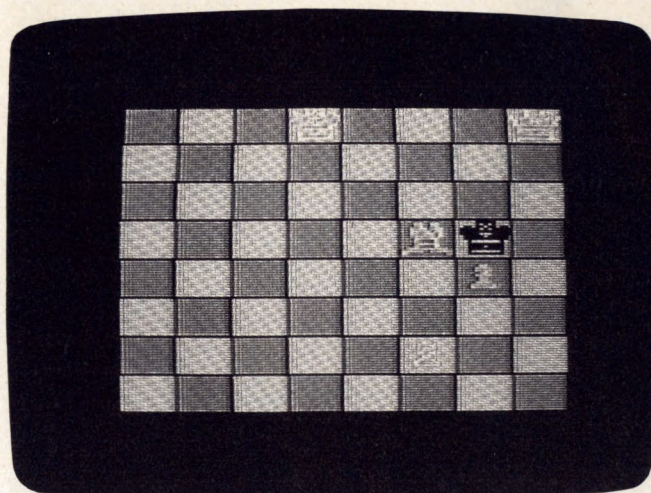
Play Options

When you choose the black pieces, the board revolves so that you're still playing from the bottom. Since the player with the white pieces always moves first, you must wait for the computer to move before you can make your first move.

If you become mentally exhausted after several bouts against the computer, give your brain a rest and watch the computer play itself. When you select this option, just sit back and watch the action. Beginners will find this feature an excellent way to learn some good strategies to use against the computer.

You don't have to begin a game from the starting position. If you choose the option to set up a position, an empty board is displayed—you can place pieces in any position with the editing keys. When the position is set up, the computer starts thinking after you make your first move.

This feature is especially useful for continuing a previous game or creating a problem for the computer to solve. It also allows you to experiment with hypothetical or downright ridiculous positions. Live out your fantasy by giving yourself ten queens versus the computer's lone king. The position doesn't even have



The computer can easily solve chess problems, such as this White mate in two.

to be a legal one. You could invent your own type of chess by giving each side two kings, for example, although the computer may get confused trying to determine when checkmate has occurred.

One of the advantages of a computer opponent is that you can tell the machine exactly how hard you want it to try to beat you. It obediently plays at that level of difficulty. This is important, because it's no fun if you always lose or always win effortlessly.

You have five skill levels to choose from. The difference between one level and another is the number of moves ahead that the computer looks. On level 1, for example, it looks two moves ahead (its move and your reply). Each succeeding level looks ahead one more move than the previous level.

Alas, the smarter play on the higher levels doesn't come without a price. The further ahead the computer looks, the more moves it must examine and, hence, the longer it thinks. The thinking time varies greatly depending on the level (about one second per move on level 1; about two *hours* on level 5).

Here's a rundown of the five levels:

Level 1: Beginner. Thinking time: one second. Look ahead: two moves. Fast but dumb.

Level 2: Intermediate. Thinking time: five seconds. Look ahead: three moves. Provides a reasonable challenge for impatient players.

Level 3: Tournament. Thinking time: two minutes. Look ahead: four moves. Since the usual time limit for tournament play is 40 moves in two hours, an average of three minutes per move, this level is best suited for serious players.

Level 4: Mate in two. Thinking time: 30 minutes. Look ahead: five moves. Capable of solving most mate-in-two problems.

Level 5: Postal chess. Thinking time: two hours. Look ahead: six moves. Simulates postal chess games where there is no time limit. Can avoid checkmate in two moves.

The thinking times given here are average times. The actual time ranges from half to twice the average time, depending on the position.

Level 4 can be used to solve mate-in-two problems such as those published in many newspapers. Just select the following options: level 4, set up position, and computer versus itself. Enter the positions using the editing keys, and then make a

do-nothing move by positioning the cursor over a white piece and pressing the RETURN key twice. After several minutes of deep thought, the computer should respond by moving one of the white pieces (the solution) and announcing checkmate. The only mate-in-two problems that the computer cannot solve are those which involve castling, *en passant* captures, or pawn promotion.

How "Chess" Thinks

You've probably heard that if a monkey sat down at a typewriter and pecked randomly at the keys for a long enough period of time, it would eventually type the complete works of Shakespeare. Theoretically, that's possible—given enough time. There's the rub. At a brisk typing speed of 50 words per minute, it would take that poor monkey billions of years just to type "To be, or not to be." Nevertheless, there *is* power in trial and error.

The Minimax Algorithm

Substitute the monkey for a high-speed computer, and this technique becomes a practical method of imitating intelligence. In fact, it has been used with great success in the field of artificial intelligence. This program uses a popular trial-and-error technique known as the *minimax* algorithm.

The computer looks at the present board position and mentally moves the pieces through all the possible combinations of future moves and countermoves up to a certain point, say three moves ahead. For each combination, it calculates a score based on which pieces were captured during the combination. Each piece is worth a certain number of points depending on its general importance: 1 point for a pawn, 3 for a knight or bishop, 5 for a rook, 9 for a queen, and 46 for a king. (Of course, since you lose the game if your king cannot escape capture, the value of a king is actually infinite, but 46 is high enough to convince the computer that it's a bad move.)

When, in a move being examined, the computer captures an opponent's piece, the value of that piece is added to the score. Conversely, when one of the computer's pieces is captured, its value is subtracted from the score. Thus, a high score is considered good for the computer, a low score good for its opponent.

The task is to find the combination that represents best play for *both* sides. This combination is not necessarily the one with the maximum score, because while the computer is trying to maximize the score, its opponent is trying just as hard to minimize it. The best combination gives maximum scores during the computer's moves, minimum scores during the opponent's moves.

After the best combination has been found, the computer's best move in the present position is simply the first move in the combination. The problem has been reduced from analyzing a chess position to finding the maximum and minimum of a series of numbers, which is much better suited to a computer.

50 Million Combinations On Level 5

Like most algorithms based on trial and error, this one requires sifting through an enormous number of combinations to find the best one. Fortunately, a few tricks can be used to reduce the combinations to a manageable number. This algorithm uses a technique called *alpha-beta cutoff*. It makes the computer search more intelligently, giving it the seemingly paradoxical ability to find the best move without looking at all the possible combinations. On level 5, for example, instead of having to search through roughly 2 billion combinations, it looks at only 50 million.

Even so, it would take BASIC from now till the middle of 1986 to generate that many combinations. That's why the algorithm is programmed in machine language. An advanced programming technique known as *recursion* (making a subroutine call itself) is used to generate all the possible combinations of moves. Capable of analyzing about 5000 combinations per second, this routine provides a moderate challenge at a reasonable playing speed.

Chess

Refer to "Guide To Typing In Programs" before entering this listing.

```

10 HIMEM: 15448
20 HOME : PRINT TAB( 18)"CHESS"
30 PRINT : PRINT TAB( 15)"JOHN KRAUSE "
40 DIM A(12),C(69)
50 FOR I = 16256 TO 16263: POKE I,192:
  NEXT I
60 FOR I = 16264 TO 16383: POKE I,7: NEXT
  I
70 FOR I = 16285 TO 16362: READ J: POKE
  I,J: NEXT I
80 FOR I = 0 TO 12: READ A(I): NEXT I
90 B(0) = 17118:B(1) = 18142:B(2) = 191
  66:B(3) = 20190:B(4) = 21214
100 FOR I = 0 TO 69: READ C(I): NEXT I
  : GOSUB 430
110 IF PEEK (16200) < > 96 THEN GOSUB
  370
120 IF B$ = "2" THEN POKE 16288,6: POKE
  16289,5: POKE 16358,250: POKE 1635
  9,251
130 IF E$ = "1" THEN 150
140 FOR R = 0 TO 7: FOR C = 0 TO 7: POKE
  16285 + 10 * R + C,0: NEXT C: NEXT
  R
150 HGR2 : FOR R = 0 TO 7: FOR C = 0 TO
  7
160 I = PEEK (16285 + 10 * R + C)
170 GOSUB 820
180 NEXT C: NEXT R:R = 0:C = 0
190 IF A$ = "1" AND B$ = "1" THEN 230
200 IF E$ = "2" THEN GOSUB 540
210 GOTO 240
220 IF A$ = "2" THEN 240
230 GOSUB 540: POKE 16202,0
240 CALL 15486: IF PEEK (16256) < 229
  AND PEEK (16256) > 150 THEN 310
250 J = PEEK (16252) + 16264:R = INT
  (J / 10 - 1628.5):C = J - 16285 -
  10 * R
260 CALL - 198:K = PEEK (J):I = 0: GOSUB
  820:I = K
270 J = PEEK (16253) + 16264:R = INT
  (J / 10 - 1628.5):C = J - 16285 -
  10 * R
280 GOSUB 820
290 IF PEEK (16256) > 99 OR PEEK (16
  256) < 28 THEN 220
300 Z = 1
310 IF PEEK (16202) THEN Z = Z + 1
320 FOR I = 1 TO 5: CALL - 198: NEXT
  I
330 K = 2:Z = Z + VAL (B$): IF Z / 2 -
  INT (Z / 2) THEN L = 15
340 GOSUB 910: GOSUB 900
350 IF PEEK ( - 16384) < 128 THEN 350
360 TEXT : RUN
370 PRINT : PRINT : PRINT "PLEASE WAIT
  ... "
380 FOR I = 24576 TO 25275: READ J: POKE
  I,J:K = K + J: NEXT I
390 FOR I = 25276 TO 25339: POKE I,255
  : NEXT I
400 FOR I = 15449 TO 16200: READ J: POKE
  I,J:K = K + J: NEXT I
410 IF K = 134648 THEN RETURN
420 POKE 16200,0: PRINT : PRINT "CHECK
  DATA STATEMENTS": STOP
430 PRINT : PRINT : PRINT "ENTER SKILL
  LEVEL (1-5)";
440 GET A$: IF VAL (A$) = 0 OR VAL (
  A$) > 5 THEN 440
450 POKE 16201, VAL (A$)
460 PRINT : PRINT : PRINT "(1) NEW GAM
  E OR (2) SET UP POSITION?";
470 GET E$: IF VAL (E$) = 0 OR VAL (
  E$) > 2 THEN 470
480 PRINT : PRINT : PRINT "COMPUTER VS
  . (1) YOU OR (2) ITSELF?";
490 GET A$: IF VAL (A$) = 0 OR VAL (
  A$) > 2 THEN 490
500 POKE 16202,0:B$ = "2": IF A$ = "2"
  THEN POKE 16202,16:B$ = "1": RETURN
510 PRINT : PRINT : PRINT "YOU HAVE TH
  E (1) WHITE OR (2) BLACK PIECE
  S?";
520 GET B$: IF VAL (B$) = 0 OR VAL (
  B$) > 2 THEN 520
530 RETURN
540 F = 0
550 I = PEEK ( - 16384): POKE - 16368
  ,0
560 IF I = 215 AND R < 7 THEN R = R +
  1: GOTO 670
570 IF I = 193 AND C > 0 THEN C = C -
  1: GOTO 670
580 IF I = 211 AND R > 0 THEN R = R -
  1: GOTO 670
590 IF I = 196 AND C < 7 THEN C = C +
  1: GOTO 670
600 IF I < 128 OR I = 141 OR F THEN 67
  0
610 J = 0
620 IF A(J) = I THEN 650
630 J = J + 1: IF J < 13 THEN 620
640 GOTO 550
650 I = J: IF I > 6 THEN I = 262 - I
660 GOSUB 820: GOTO 540
670 POKE 251,R: POKE 252,C
680 J = 16285 + 10 * R + C:K = PEEK (J
  )
690 IF I = 141 THEN 740
700 POKE 8,7: CALL 24576
710 FOR J = 0 TO 30: NEXT J
720 I = K: GOSUB 850
730 FOR J = 0 TO 60: NEXT J: GOTO 550
740 IF F THEN 790
750 IF K = 0 OR K > 6 THEN 550
760 F = 1:R1 = R:C1 = C: CALL - 198
770 IF PEEK ( - 16368) = 141 THEN 770
780 GOTO 550
790 R2 = R:C2 = C:R = R1:C = C1:I = 0
800 K = PEEK (16285 + 10 * R + C): GOSUB
  820
810 R = R2:C = C2:I = K
820 IF R = 0 AND I = 255 THEN I = 251
830 IF R = 7 AND I = 1 THEN I = 5
840 POKE 16285 + 10 * R + C,I
850 IF I > 6 THEN I = 384 - I
860 IF B$ = "1" OR I = 0 THEN 890
870 IF I > 6 THEN I = I - 256
880 I = I + 128
890 POKE 251,R: POKE 252,C: POKE 8,I: CALL
  24576: RETURN
900 K = 7:M = 3:L = 30
910 FOR J = 0 TO K: FOR I = 0 TO 4: POKE
  B(I) + M + J,C(L):L = L + 1: NEXT
  I: NEXT J: RETURN
920 DATA 4,2,3,5,6,3,2,4,7,7,1,1,1,1,
  1,1,1,7
930 DATA 7,0,0,0,0,0,0,0,7,7,0,0,0,0
  ,0,0,0,0,7

```


940 DATA 7,0,0,0,0,0,0,0,0,7,7,0,0,0,0,0,0,0,0,7

950 DATA 7,255,255,255,255,255,255,255,255,255,7

960 DATA 7,252,254,253,251,250,253,254,252

970 DATA 160,208,206,194,210,209,203,144,142,130,146,145,139

980 DATA 19,21,19,21,115,68,42,46,42,74,21,20,12,20,21

990 DATA 85,85,119,87,85,100,68,68,68,68,29,4,12,4,28

1000 DATA 72,40,72,8,104,1,64,64,65,0,43,40,56,40,43,103,17,19,17,103

1010 DATA 42,106,102,42,42,73,21,29,21,21,59,9,25,9,57,35,37,37,5,35

1020 DATA 165,251,69,252,41,1,133,48

1030 DATA 32,19,96,166,8,208,1,96

1040 DATA 232,134,48,165,48,41,15,168

1050 DATA 185,170,96,133,6,185,179,96

1060 DATA 133,7,169,0,133,9,164,251

1070 DATA 185,162,96,133,254,165,252,10

1080 DATA 10,24,121,154,96,133,253,32

1090 DATA 75,96,165,253,24,105,128,133

1100 DATA 253,165,254,56,233,32,133,254

1110 DATA 76,75,96,32,90,96,165,254

1120 DATA 24,105,4,133,254,201,96,48

1130 DATA 242,96,169,3,133,25,164,48

1140 DATA 240,41,136,240,38,16,19,164

1150 DATA 9,177,6,230,9,73,255,164

1160 DATA 25,49,253,145,253,198,25,16

1170 DATA 238,96,164,9,177,6,230,9

1180 DATA 164,25,17,253,145,253,198,25

1190 DATA 16,240,96,164,9,177,6,230

1200 DATA 9,164,25,145,253,198,25,16

1210 DATA 242,96,84,84,44,44,44,44

1220 DATA 4,4,65,64,67,66,65,64

1230 DATA 67,66,188,252,60,124,188,252

1240 DATA 60,124,188,96,96,97,97,97

1250 DATA 97,98,98,98

1260 DATA 0,0,0,0,213,170,213,170,213,170,213,170,213,170,213,170

1270 DATA 213,170,213,170,213,170,213,170,213,170,213,170,213,170

1280 DATA 213,170,213,170,213,170,213,170,213,170,213,170,213,170

1290 DATA 213,170,213,170,213,170,213,170,213,170,213,170,213,170

1300 DATA 0,0,0,0,42,85,42,84,42,85,42,84,42,85,42,84

1310 DATA 42,85,42,84,42,85,42,84,42,85,42,84,42,85,42,84

1320 DATA 42,85,42,84,42,85,42,84,42,85,42,84,42,85,42,84

1330 DATA 42,85,42,84,42,85,42,84,42,85,42,84,42,85,42,84

1340 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,3,96,0

1350 DATA 0,15,120,0,0,15,120,0,0,3,96,0,0,15,120,0

1360 DATA 0,3,96,0,0,3,96,0,0,15,120,0,0,63,126,0

1370 DATA 0,63,126,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0

1380 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,1,64,0,0,7,64

1390 DATA 0,0,127,64,0,15,127,112,0,63,126,48,0,63,127,112

1400 DATA 1,127,127,112,1,127,127,124,7,127,103,124,7,127,96,48

1410 DATA 7,127,120,0,7,127,126,0,7,127,127,64,0,0,0,0

1420 DATA 0,0,0,0,0,0,0,0,0,0,0,0,0,60,30,0,0,60,30,0

1430 DATA 1,124,127,64,1,115,127,64,1,79,127,64,1,79,127,64

1440 DATA 0,63,126,0,0,48,6,0,0,63,126,0,0,48,6,0

1450 DATA 7,127,127,112,31,124,31,124,24,0,0,12,0,0,0,0

1460 DATA 0,0,0,0,0,0,0,0,0,3,103,115,96,3,103,115,96

1470 DATA 3,127,127,96,0,96,3,0,0,127,127,0,0,127,127,0

1480 DATA 0,127,127,0,0,127,127,0,0,127,127,0,0,96,3,0

1490 DATA 3,127,127,96,15,127,127,120,15,127,127,120,0,0,0,0

1500 DATA 0,0,0,0,0,0,0,0,0,48,24,0,0,48,24,0

1510 DATA 96,48,24,12,97,124,126,12,25,124,126,48,25,124,126,48

1520 DATA 31,127,127,112,6,0,1,64,7,127,127,64,7,124,127,64

1530 DATA 7,127,127,64,6,0,1,64,7,127,127,64,0,0,0,0

1540 DATA 0,0,0,0,0,63,120,0,0,51,24,0,30,60,121,112

1550 DATA 127,115,31,124,127,127,127,124,127,112,31,124,31,124,127,112

1560 DATA 31,127,127,112,6,0,1,64,7,127,127,64,7,124,127,64

1570 DATA 7,127,127,64,6,0,1,64,7,127,127,64,0,0,0,0

1580 DATA 21,12,248,237,235,244,8,19,10,11,1,247,246,245,255

1590 DATA 9,11,247,245,9,10,1,246,255,46,9,5,3,3,1

1600 DATA 0,1,3,3,5,9,46,120,169,192,141,128,63,162,0

1610 DATA 142,127,63,202,142,126,63,76,97,61,189,108,63,24,125

1620 DATA 116,63,72,168,185,136,63,188,108,63,153,136,63,104,168

1630 DATA 189,76,63,153,136,63,24,105,6,168,174,73,63,169,0

1640 DATA 157,129,63,174,126,63,185,113,60,56,253,129,63,168,169

1650 DATA 192,157,129,63,152,224,0,208,34,221,128,63,48,28,208

1660 DATA 11,173,35,192,205,127,63,144,18,141,127,63,140,128,63

1670 DATA 173,108,63,141,124,63,173,116,63,141,125,63,96,221,128

1680 DATA 63,48,250,240,248,152,157,128,63,189,75,63,24,105,6

1690 DATA 168,185,113,60,56,253,128,63,221,127,63,48,59,224,1

1700 DATA 240,221,221,127,63,240,50,96,189,108,63,24,125,116,63

1710 DATA 141,75,63,168,185,136,63,172,74,63,208,6,201,1,16

1720 DATA 192,48,8,201,0,48,186,201,7,240,182,157,76,63,201

1730 DATA 6,240,4,201,250,208,12,169,46,157,128,63,104,104,104

1740 DATA 104,76,229,61,188,108,63,185,136,63,172,75,63,153,136

1750 DATA 63,188,108,63,169,0,153,136,

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63, 236, 73, 63, 208, 3, 76
1760 DATA 144, 60, 232, 142, 126, 63, 169, 20
157, 108, 63, 169, 16, 56, 237
1770 DATA 74, 63, 141, 74, 63, 254, 108, 63, 1
88, 108, 63, 185, 136, 63, 201
1780 DATA 7, 240, 86, 172, 74, 63, 240, 4, 201
0, 16, 77, 192, 0, 208
1790 DATA 4, 201, 1, 48, 69, 201, 0, 16, 9, 188
108, 63, 169, 0, 56
1800 DATA 249, 136, 63, 201, 1, 208, 6, 32, 5,
62, 76, 222, 61, 201, 2
1810 DATA 208, 6, 32, 192, 62, 76, 222, 61, 20
1, 3, 208, 6, 32, 218, 62
1820 DATA 76, 222, 61, 201, 4, 208, 6, 32, 230
62, 76, 222, 61, 201, 5
1830 DATA 208, 6, 32, 242, 62, 76, 222, 61, 32
47, 63, 76, 222, 61, 189
1840 DATA 108, 63, 201, 98, 48, 150, 224, 0, 2
40, 16, 169, 16, 56, 237, 74
1850 DATA 63, 141, 74, 63, 202, 142, 126, 63,
76, 144, 60, 173, 124, 63, 24
1860 DATA 109, 125, 63, 141, 125, 63, 88, 96,
173, 74, 63, 208, 89, 189, 108
1870 DATA 63, 24, 105, 10, 168, 185, 136, 63,
208, 36, 169, 10, 157, 116, 63
1880 DATA 32, 21, 61, 189, 108, 63, 201, 31, 4
8, 21, 201, 39, 16, 17, 24
1890 DATA 105, 20, 168, 185, 136, 63, 208, 8,
169, 20, 157, 116, 63, 32, 21
1900 DATA 61, 189, 108, 63, 24, 105, 9, 168, 1
85, 136, 63, 16, 8, 169, 9
1910 DATA 157, 116, 63, 32, 21, 61, 189, 108,
63, 24, 105, 11, 168, 185, 136

1920 DATA 63, 16, 8, 169, 11, 157, 116, 63, 32
21, 61, 96, 189, 108, 63
1930 DATA 56, 233, 10, 168, 185, 136, 63, 208
36, 169, 246, 157, 116, 63, 32
1940 DATA 21, 61, 189, 108, 63, 201, 81, 48, 2
1, 201, 89, 16, 17, 56, 233
1950 DATA 20, 168, 185, 136, 63, 208, 8, 169,
236, 157, 116, 63, 32, 21, 61
1960 DATA 189, 108, 63, 56, 233, 9, 168, 169,
0, 217, 136, 63, 16, 8, 169
1970 DATA 247, 157, 116, 63, 32, 21, 61, 189,
108, 63, 56, 233, 11, 168, 169
1980 DATA 0, 217, 136, 63, 16, 8, 169, 245, 15
7, 116, 63, 32, 21, 61, 96
1990 DATA 169, 0, 157, 84, 63, 168, 185, 89, 6
0, 157, 116, 63, 32, 21, 61
2000 DATA 254, 84, 63, 188, 84, 63, 192, 8, 48
237, 96, 169, 4, 157, 100
2010 DATA 63, 169, 0, 157, 84, 63, 240, 22, 16
9, 8, 157, 100, 63, 169, 4
2020 DATA 157, 84, 63, 208, 10, 169, 8, 157, 1
00, 63, 169, 0, 157, 84, 63
2030 DATA 168, 185, 105, 60, 157, 116, 63, 15
7, 92, 63, 32, 21, 61, 189, 108
2040 DATA 63, 24, 125, 116, 63, 168, 185, 136
63, 208, 13, 189, 116, 63, 24
2050 DATA 125, 92, 63, 157, 116, 63, 76, 6, 63
254, 84, 63, 189, 84, 63
2060 DATA 221, 100, 63, 48, 206, 96, 169, 0, 1
57, 84, 63, 168, 185, 97, 60
2070 DATA 157, 116, 63, 32, 21, 61, 254, 84, 6
3, 188, 84, 63, 192, 8, 48
2080 DATA 237, 96

Spelling Bee

Clark and Kathy H. Kidd

Spelling doesn't have to be a chore. In this entertaining word game for elementary school children, the Apple chooses words (which you can easily change or add to) and puts them on the screen. Filling in the blanks takes a good memory. For all Apple II computers.

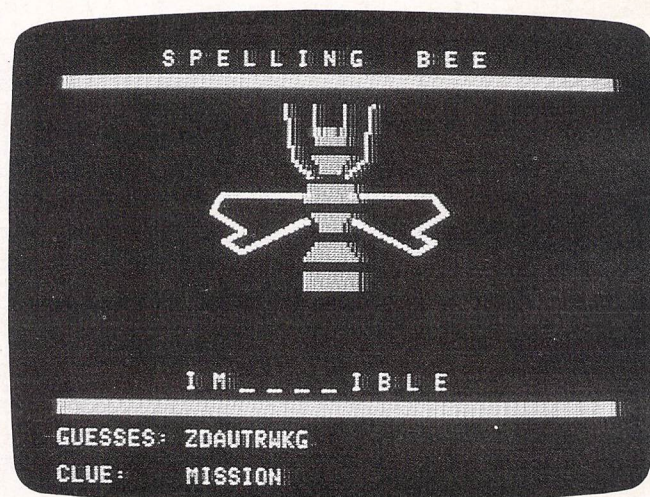
The Mighty Bee

If there's such a thing as a guardian angel of spelling, the spelling bee is it. As long as you're doing a good job at your spelling, she'll stay away and leave you alone. If you don't do well, though, she'll decide she needs to watch. Slowly but surely, she'll appear. The object of "Spelling Bee" is to guess the letters in the words the spelling bee gives you before she completely appears and you get stung. If you guess a word correctly, she'll keep calm and invisible until the next word.

Bee Pieces

Type in Spelling Bee (make sure you save a copy of it before you try to run it), load, and run it. After a short introduction, your Apple asks you to select a skill level. If you want to play with easy words, press 1. Medium-length words or harder words can be given to the bee by pressing the 2 or 3 key respectively. Next, your computer asks if you want a hint after the sixth guess. Hit the Y key for Yes, or N for No. If you're just starting out, the hint can be a great help.

A line of dashes appears on the screen, each dash representing a letter in the word you'll try to uncover. Type a letter you think may be in the word. If the letter belongs in the word, it appears in the right place. If it doesn't



The spelling bee is almost complete. You've got just one more attempt to uncover the word.

belong, however, the letter shows up near the bottom of the screen to remind you that it's already been tried. Not only that, but the bee's left antenna suddenly shows at the top of the screen. You'll hear a ferocious buzz. Each time you guess incorrectly, the spelling bee gives you another buzz—another of her pieces also magically appears. After 11 incorrect guesses, the bee is complete, and the entire word is shown to you. Your turn is over. But if you correctly fill in the blanks, music plays.

You'll notice that your incorrect guesses display at the bottom of the screen, and remain there for the rest of the turn. If you choose a letter that's already been used, you'll hear a blip blip sound. That guess won't be counted.

After each word, you can challenge the spelling bee again. Press Y for Yes or N for No.

Beating The Bee

No point score is given in Spelling Bee. Either you uncover the correct word or you don't. When you decide to quit playing, just press the N key when the bee asks if you want another word. You'll see how many words you uncovered since you began playing this session of the game. The computer also shows you how many words you missed. A final score, expressed as a percentage of correct answers, also displays.

Make Your Own List

You can even customize Spelling Bee to suit your own needs. If your child has a spelling word list which he or she needs to study, for instance, you can use this program as a study aid.

The number of words in each skill level are defined by the variable $NW=50$ in line 110. Adjust this value as necessary. Make sure, however, that the number of words and clues in all three levels are changed accordingly. The words and clues are defined in DATA statements in the following line ranges:

Beginning words	Lines 10010-10090
Intermediate words	Lines 20010-20070
Advanced words	Lines 30010-30080

Any new words you add should not be longer than 20 letters.

DOS

Spelling Bee works on all Apple II computers, from the Apple II to the Apple IIc. The program is a bit less than 9K in length, so it should work on any memory configuration. Better yet, Spelling Bee works with DOS 3.3 or ProDOS. You don't have to change anything. Just load and run the program normally.

Spelling Bee

Refer to "Guide To Typing In Programs" before entering this listing.

```
100 REM *** SPELLING BEE
105 LOMEM: 24576: HIMEM: 36096: TEXT :
    HOME
110 NW% = 50
120 DIM WD$(NW%), CL$(NW%), MX%(NW%), WW$
    (20)
140 GOSUB 9000: GOSUB 8400
150 FOR Z = 12 TO 1 STEP - 1: X = Z: GOSUB
    8500: NEXT : GOSUB 9500
160 FOR X = 1 TO 2000: NEXT : TEXT : HOME
    : HTAB 1: VTAB 6
190 PRINT "THIS GAME TEACHES YOU TO RE
    COGNIZE": PRINT "AND SPELL COMMON
    WORDS."
200 PRINT : PRINT "THE COMPUTER SELECT
    S A WORD AND": PRINT "SHOWS YOU TH
    E NUMBER OF LETTERS": PRINT "IT CO
    NTAINS."
210 PRINT : PRINT "YOU TRY TO GUESS TH
```

```

E WORD BY GUESSING": PRINT "ONE LE
TTER AT A TIME."
220 PRINT : PRINT "MORE THAN 11 INCORR
ECT LETTERS WILL": PRINT "CAUSE TH
E ";: FLASH : PRINT "SPELLING BEE"
    ;: NORMAL : PRINT " TO APPEAR."
230 HTAB 9: VTAB 23: INVERSE : PRINT "
PRESS ANY KEY TO START": NORMAL
240 IF PEEK ( - 16384) < 128 THEN 240
250 POKE - 16368,0
300 REM *** GET SKILL LEVEL
310 HOME : HTAB 1: VTAB 3: PRINT "ENTE
R SKILL LEVEL DESIRED:"
320 INVERSE : PRINT : PRINT : PRINT "1
";: NORMAL : PRINT " - BEGINNER"
330 INVERSE : PRINT : PRINT "2";: NORMAL
    : PRINT " - INTERMEDIATE"
340 INVERSE : PRINT : PRINT "3";: NORMAL
    : PRINT " - ADVANCED"
350 IF PEEK ( - 16384) < 128 THEN 350
360 SK% = PEEK ( - 16384) - 128: POKE
    - 16368,0
370 IF SK% < 49 OR SK% > 51 THEN PRINT
    CHR$ (7);: GOTO 350
380 SK% = SK% - 48: GOSUB 8000
400 REM *** SEE IF A CLUE IS WANTED
410 PRINT : PRINT : PRINT : PRINT "DO
    YOU WANT A HINT AFTER THE 6TH GUESS ?"
420 PRINT : PRINT "PRESS ";: INVERSE :
    PRINT "Y";: NORMAL : PRINT " FOR
    YES OR ";: INVERSE : PRINT "N";: NORMAL
    : PRINT " FOR NO."
430 IF PEEK ( - 16384) < 128 THEN 430
440 QL$ = CHR$ ( PEEK ( - 16384) - 128
    )
450 POKE - 16368,0: GOSUB 9600: CD$ =
    QU$: IF CD$ = "Y" OR CD$ = "N" THEN
    470
460 PRINT CHR$ (7);: GOTO 430
470 WR = 0: WW = 0: HOME
500 FOR X = 1 TO NW%: MX%(X) = 0: NEXT
510 FOR X = 1 TO NW%: J = 0
520 I = INT ( RND (1) * NW%) + 1: IF M
    X%(I) = 0 THEN 570
530 J = J + 1: IF J < 10 THEN 520
540 I = 1
550 IF MX%(I) = 0 THEN 570
560 I = I + 1: GOTO 550
570 MX%(I) = X: NEXT
580 LP = 0
600 LP = LP + 1: IF LP > NW% THEN 500
605 W1$ = WD$(MX%(LP)): LW = LEN (W1$):
    SO = 20 - LW: MC = 0: LG$ = "": LR$ =
    "": IF SO < 1 THEN SO = 1
610 GOSUB 8400: FOR X = 1 TO LW: IF MID$
    (W1$, X, 1) = " " THEN 630
620 VTAB 19: HTAB SO + ((X - 1) * 2): PRINT
    " ";
630 NEXT : VTAB 22: HTAB 1: PRINT "GUE
    SSES:";
650 FOR X = 1 TO LW: WW$(X) = MID$ (W1
    $, X, 1): NEXT
700 IF PEEK ( - 16384) < 128 THEN 700
710 QL$ = CHR$ ( PEEK ( - 16384) - 128
    ): POKE - 16368,0: GOSUB 9600: IF
    QU$ < "A" OR QU$ > "Z" THEN PRINT
    CHR$ (7);: GOTO 700
714 Y$ = LG$ + LR$: IF LEN (Y$) = 0 THEN
    726
716 Y = 0: FOR X = 1 TO LEN (Y$): IF Q
    U$ = MID$ (Y$, X, 1) THEN Y = 1
718 NEXT : IF Y = 1 THEN PRINT CHR$
    (7);: GOTO 700
726 X$ = QU$: Y = 0: FOR X = 1 TO LW: IF
```



```

      WW$(X) < > X$ THEN 750
728 WW$(X) = " "
730 VTAB 19: HTAB 50 + ((X - 1) * 2): PRINT
      X$;:Y = 1
750 NEXT : IF Y > 0 THEN 800
760 LG$ = LG$ + X$:X = LEN (LG$): GOSUB
      8500
765 POKE 864,12: POKE 865,40: CALL 866
770 VTAB 22: HTAB 10: PRINT LG$;
775 IF LEN (LG$) < > 6 OR CD$ = "N" THEN
      785
780 VTAB 24: HTAB 1: PRINT "CLUE: "
      ;CL$(MX$(LP));
785 IF LEN (LG$) < 12 THEN 700
790 GOTO 1000
800 Y = 0: FOR X = 1 TO LW: IF WW$(X) <
      > " " THEN Y = Y + 1
810 NEXT :LR$ = LR$ + X$: IF Y > 0 THEN
      700
820 FOR X = 150 TO 180 STEP 5
830 POKE 864,2: POKE 865,X: CALL 866: NEXT
840 FOR X = 1 TO 2500: NEXT
850 WR = WR + 1
860 GOTO 1500
1000 FOR X = 1 TO LW: IF WW$(X) = " " THEN
      1050
1010 VTAB 19: HTAB 50 + ((X - 1) * 2):
      PRINT WW$(X);
1050 NEXT :WW = WW + 1
1060 FOR X = 80 TO 40 STEP - 5: POKE
      864,2: POKE 865,X: CALL 866: NEXT
1070 FOR X = 1 TO 3500: NEXT
1080 GOTO 1500
1500 HOME : TEXT : NORMAL : HTAB 15: VTAB
      3: FLASH : PRINT "GAME OVER!": NORMAL
1510 HTAB 1: VTAB 6: PRINT "WANT TO TR
      Y ANOTHER WORD?"
1520 PRINT : PRINT : PRINT " ";; INVERSE
      : PRINT "Y";: NORMAL : PRINT " = Y
      ES"
1530 PRINT : PRINT " ";; INVERSE : PRINT
      "N";: NORMAL : PRINT " = NO"
1540 IF PEEK ( - 16384) < 128 THEN 15
      40
1550 QL$ = CHR$ ( PEEK ( - 16384) - 12
      8): POKE - 16368,0: GOSUB 9600
1560 IF QU$ = "Y" THEN 600
1570 IF QU$ < > "N" THEN PRINT CHR$
      (7);: GOTO 1540
1580 X$ = " " + STR$ (WR):Y$ = " "
      + STR$ (WW)
1590 PRINT : PRINT : PRINT "WORDS RIGH
      T = "; RIGHT$ (X$,3): PRINT : PRINT
      "WORDS WRONG = "; RIGHT$ (Y$,3)
1600 X = INT ((WR * 100) / (WR + WW)):
      X$ = " " + STR$ (X) + "%"
1610 PRINT : PRINT "FINAL SCORE = "; RIGHT$
      (X$,4)
1620 GOSUB 9500: HOME
1630 END
8000 REM *** LOAD THE WORD TABLE
8010 ON SK% GOTO 8020,8030,8040
8020 X$ = "$B-WORD": GOTO 8050
8030 X$ = "$I-WORD": GOTO 8050
8040 X$ = "$A-WORD"
8050 RESTORE
8060 READ Y$: IF Y$ < > X$ THEN 8060
8070 FOR X = 1 TO NW%
8080 READ WD$(X),CL$(X): NEXT : RETURN
8400 REM DRAW BASIC SCREEN
8410 HOME : POKE 230,64: CALL 62450: HGR2
8420 HTAB 8: VTAB 2
8430 PRINT "S P E L L I N G B E E"
8440 HCOLOR= 6: FOR X = 19 TO 24: HPLLOT
      0,X TO 279,X: NEXT
8450 FOR X = 156 TO 161: HPLLOT 0,X TO
      279,X: NEXT
8470 RETURN
8500 REM DRAW THE BEE
8510 I = 74:J = 28: ON X GOTO 8525,8550
      ,8575,8600,8625,8650,8675,8700,872
      5,8800,8750,8775
8525 HCOLOR= 2: FOR X = 53 TO 54: FOR
      Y = 4 TO 13: GOSUB 8888: NEXT Y,X
8530 FOR X = 53 TO 56: FOR Y = 14 TO 1
      7: GOSUB 8888: NEXT Y,X: RETURN
8550 HCOLOR= 2: FOR X = 70 TO 71: FOR
      Y = 4 TO 13: GOSUB 8888: NEXT Y,X
8560 FOR X = 68 TO 71: FOR Y = 14 TO 1
      7: GOSUB 8888: NEXT Y,X: RETURN
8575 HCOLOR= 5: FOR X = 58 TO 65: FOR
      Y = 14 TO 17: GOSUB 8888: NEXT Y,X
      : FOR X = 54 TO 69: FOR Y = 18 TO
      21: GOSUB 8888: NEXT Y,X
8580 FOR X = 52 TO 71: FOR Y = 26 TO 2
      7: GOSUB 8888: NEXT Y,X: FOR X = 5
      4 TO 69: FOR Y = 28 TO 29: GOSUB 8
      888: NEXT Y,X
8585 FOR X = 56 TO 67: FOR Y = 30 TO 3
      3: GOSUB 8888: NEXT Y,X: RETURN
8600 HCOLOR= 5: FOR X = 50 TO 73: FOR
      Y = 38 TO 41: GOSUB 8888: NEXT Y,X
8610 FOR X = 48 TO 75: FOR Y = 42 TO 4
      5: GOSUB 8888: NEXT Y,X
8615 FOR X = 52 TO 71: FOR Y = 50 TO 5
      1: GOSUB 8888: NEXT Y,X: FOR X = 5
      4 TO 69: FOR Y = 52 TO 53: GOSUB 8
      888: NEXT Y,X
8620 FOR X = 56 TO 67: FOR Y = 54 TO 5
      7: GOSUB 8888: NEXT Y,X: RETURN
8625 HCOLOR= 1: HPLLOT I + 52,J + 35 TO
      I + 42,J + 27 TO I + 38,J + 4: HPLLOT
      I + 53,J + 35 TO I + 43,J + 27 TO
      I + 39,J + 4: RETURN
8650 HCOLOR= 1: HPLLOT I + 70,J + 35 TO
      I + 80,J + 27 TO I + 84,J + 4: HPLLOT
      I + 71,J + 35 TO I + 81,J + 27 TO
      I + 85,J + 4: RETURN
8675 HCOLOR= 3: HPLLOT I + 47,J + 42 TO
      I + 8,J + 42 TO I + 4,J + 46 TO I +
      2,J + 50 TO I + 18,J + 58 TO I + 8
      ,J + 62 TO I + 16,J + 66 TO I + 50
      ,J + 52
8680 HPLLOT I + 47,J + 43 TO I + 8,J +
      43 TO I + 5,J + 46 TO I + 3,J + 50
      TO I + 19,J + 58 TO I + 9,J + 62 TO
      I + 17,J + 66 TO I + 51,J + 53: RETURN
8700 HCOLOR= 3: HPLLOT I + 78,J + 42 TO
      I + 114,J + 42 TO I + 116,J + 46 TO
      I + 120,J + 50 TO I + 104,J + 58 TO
      I + 114,J + 62 TO I + 106,J + 66 TO
      I + 74,J + 52
8710 HPLLOT I + 78,J + 43 TO I + 114,J +
      43 TO I + 117,J + 46 TO I + 121,J +
      50 TO I + 105,J + 58 TO I + 115,J +
      62 TO I + 107,J + 66 TO I + 74,J +
      53: RETURN
8725 HCOLOR= 5: FOR X = 54 TO 69: FOR
      Y = 62 TO 63: GOSUB 8888: NEXT Y,X
      : FOR X = 52 TO 71: FOR Y = 64 TO
      65: GOSUB 8888: NEXT Y,X
8730 FOR X = 50 TO 73: FOR Y = 66 TO 6
      7: GOSUB 8888: NEXT Y,X: FOR X = 4
      8 TO 75: FOR Y = 68 TO 69: GOSUB 8
      888: NEXT Y,X
8735 FOR X = J + 74 TO J + 81: HPLLOT I
      + 48,X TO I + 75,X: NEXT : RETURN

```



```

8750 HCOLOR= 1: HPLLOT I + 52,J + 56 TO
I + 38,J + 68 TO I + 14,J + 74: HPLLOT
I + 53,J + 57 TO I + 39,J + 69 TO
I + 15,J + 75: RETURN
8775 HCOLOR= 1: HPLLOT I + 70,J + 56 TO
I + 84,J + 68 TO I + 108,J + 74: HPLLOT
I + 71,J + 57 TO I + 85,J + 69 TO
I + 109,J + 75: RETURN
8800 HCOLOR= 5: FOR X = 48 TO 75: FOR
Y = 86 TO 87: GOSUB 8888: NEXT Y,X
: FOR X = 50 TO 73: FOR Y = 88 TO
89: GOSUB 8888: NEXT Y,X
8805 FOR X = 52 TO 71: FOR Y = 90 TO 9
1: GOSUB 8888: NEXT Y,X: FOR X = 5
6 TO 67: FOR Y = 92 TO 93: GOSUB 8
888: NEXT Y,X
8810 FOR X = 60 TO 63: FOR Y = 94 TO 9
5: GOSUB 8888: NEXT Y,X: RETURN
8888 HPLLOT I + X,J + Y: RETURN
9000 REM *** LOAD CUSTOM CHARACTERS
9010 X = 36096
9020 READ Y: IF Y < 0 THEN 9100
9030 FOR Z = X + (Y * 8) TO X + (Y * 8
) + 7
9040 READ I: POKE Z,I: NEXT
9050 GOTO 9020
9100 FOR X = 768 TO 855: READ Y: POKE
X,Y: NEXT
9105 POKE 6,0: POKE 7,141: IF PEEK (9
78) = 190 THEN PRINT : PRINT CHR$
(4);"PR# A$300": RETURN
9110 POKE 54,0: POKE 55,3: CALL 1002
9120 RETURN
9130 DATA 33,8,20,34,34,62,34,34,0
9135 DATA 34,30,34,34,30,34,34,30,0
9140 DATA 35,28,34,2,2,2,34,28,0
9145 DATA 36,30,34,34,34,34,34,30,0
9150 DATA 37,62,2,2,30,2,2,62,0
9155 DATA 38,62,2,2,30,2,2,2,0
9160 DATA 39,60,2,2,2,50,34,60,0
9165 DATA 40,34,34,34,62,34,34,34,0
9170 DATA 41,28,8,8,8,8,8,28,0
9175 DATA 42,32,32,32,32,32,34,28,0
9180 DATA 43,34,18,10,6,10,18,34,0
9185 DATA 44,2,2,2,2,2,2,62,0
9190 DATA 45,34,54,42,42,34,34,34,0
9193 DATA 26,0,0,8,0,8,0,0,0
9195 DATA 46,34,34,38,42,50,34,34,0
9200 DATA 47,28,34,34,34,34,34,28,0
9205 DATA 48,30,34,34,30,2,2,2,0
9210 DATA 49,28,34,34,34,42,18,44,0
9215 DATA 50,30,34,34,30,10,18,34,0
9220 DATA 51,28,34,2,28,32,34,28,0
9225 DATA 52,62,8,8,8,8,8,8,0
9230 DATA 53,34,34,34,34,34,34,28,0
9235 DATA 54,34,34,34,34,34,20,8,0
9240 DATA 55,34,34,34,42,42,54,34,0
9245 DATA 56,34,34,20,8,20,34,34,0
9250 DATA 57,34,34,20,8,8,8,8,0
9255 DATA 58,62,32,16,8,4,2,62,0
9260 DATA 16,28,34,50,42,38,34,28,0
9265 DATA 17,8,12,8,8,8,8,28,0
9270 DATA 18,28,34,32,24,4,2,62,0
9275 DATA 19,62,32,16,24,32,34,28,0
9280 DATA 20,16,24,20,18,62,16,16,0
9285 DATA 21,62,2,30,32,32,34,28,0
9290 DATA 22,56,4,2,30,34,34,28,0
9295 DATA 23,62,32,16,8,4,4,4,0
9300 DATA 24,28,34,34,28,34,34,28,0
9305 DATA 25,28,34,34,60,32,16,14,0
9310 DATA 0,0,0,0,0,0,0,0,0
9315 DATA 12,0,0,0,0,0,8,8,4,0
9320 DATA 14,0,0,0,0,0,0,8,0
9325 DATA 63,0,0,0,0,0,0,0,127

```

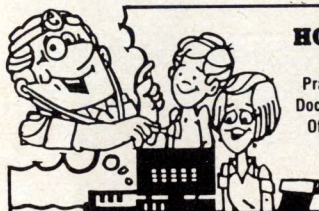
```

9330 DATA -1
9335 DATA 216,120,133,69,134,70,132,7
1,166,7,10,10,176,4,16,62,48,4
9340 DATA 16,1,232,232,10,134,27,24,1
01,6,133,26,144,2,230,27
9345 DATA 165,40,133,8,165,41,41,3,5,
230,133,9,162,8,160,0
9350 DATA 177,26,36,50,48,2,73,127,1
64,36,145,8,230,26,208,2
9355 DATA 230,27,165,9,24,105,4,133,9
,202,208,226,165,69,166,70,164,71,
88,76,240,253
9500 REM SUBROUTINE TO PLAY SONGS
9510 RESTORE
9520 READ QX$: IF QX$ < > "$SONG" THEN
9520
9530 FOR X = 866 TO 891: READ Y: POKE
X,Y: NEXT
9540 READ X,Y: IF X < 0 THEN RETURN
9550 POKE 864,Y: POKE 865,X: CALL 866:
GOTO 9540
9560 DATA "$SONG",172,97,3,174,97,3,2
32,208,253,169,4,32,168,252,173,48
,192,136,208,239,206,96,3,208,231,
96
9570 DATA 125,4,134,4,151,4,151,4,151
,4,134,4,125,4,105,4,85,8,-1,0
9600 REM *** UPPER-CASE
9610 QU$ = "": FOR X = 1 TO LEN (QL$):
Y = ASC ( MID$ (QL$,X,1)): IF Y >
96 AND Y < 123 THEN Y = Y - 32
9620 QU$ = QU$ + CHR$ (Y): NEXT : RETURN
10000 DATA "$B-WORD"
10010 DATA BOY,"YOUNG MAN",GIRL,"YOUN
G WOMAN",FIRST,"THE EARLIEST",HER,
"BELONGING TO A GIRL",WERE,"USED T
O BE"
10020 DATA TAKE,"GET OR RECEIVE",NAME
,"PEOPLE CALL YOU THIS",DAY,"SUNRI
SE TO SUNSET",ASK,"QUESTION"
10030 DATA SUN,"THE NEAREST STAR",WI
TH,"TOGETHER OR AGAINST",WHEN,"AT
A SET TIME",THEM,"OTHER PEOPLE"
10040 DATA AND,"TOGETHER WITH",WENT,"
GONE ALREADY",STOP,HALT,CAN,"IS AB
LE TO",LOOK,"TO SEE",READ,"LOOK AT
WORDS"
10050 DATA BOOK,"WHAT YOU READ",BEAT,
"TO DEFEAT",TIME,"IT MARCHES ON",R
IDE,"NOT WALKING",ADD,"PLUS SIGN",
BALL,"ROUND TOY"
10060 DATA HARD,"NOT SOFT",BIG,LARGE,
MAKE,CREATE,CAME,ARRIVED,GAME,CONT
EST,GREEN,"A COLOR",GOOD,"NOT BAD"
,SAY,TALK
10070 DATA MEAN,CRUEL,TREE,"TALL PLAN
T",HAD,"WAS YOURS",TOP,"NOT THE BO
TTOM",MAN,"ADULT BOY",GAVE,"TURNED
OVER"
10080 DATA ROCK,"A STONE",BELL,"RING
IT",SAW,"A TOOL",BOX,CONTAINER,CAR
,VEHICLE,CAT,FELINE,DOG,"ARF ARF",
PIG,HAM
10090 DATA MILK,"COW JUICE",SONG,TUNE
,BONE,"SKELETON PART"
20000 DATA "$I-WORD"
20010 DATA AFTERNOON,"NOT MORNING",BE
CAUSE,SINCE,THIRD,"A BASE",ALWAYS,
"ALL THE TIME",ANIMAL,"A COW IS ON
E",BASEBALL,"NINE PLAYERS",ALIKE,S
IMILAR
20020 DATA CLOCK,TIMEPIECE,BROTHER,"N
OT A SISTER",CATCH,"GET FISH",MORN
ING,"BEFORE NOON",SEVEN,DWARVES,FR

```


IEND, BUDDY, GROUND, EARTH
 20030 DATA HOUSE, HOME, LEARN, UNDERSTAND, LARGE, BIG, LUNCH, "NOON MEAL", PURPLE, "RED AND BLUE", HORSE, "ADULT PONY", LAST, FINAL
 20040 DATA BEST, SUPERIOR, SCHOOL, TEACHER, LITTLE, "THREE PIGS", UNDER, BELOW, WATER, "A DRINK", LETTER, MAIL, AROUND, "ON ALL SIDES"
 20050 DATA DRINK, WATER, THANK, "BE GRATEFUL", PRINT, "FOOT AND FINGER", AGAIN, REPEAT, ABOVE, "NOT BELOW", SISTER, "NOT A BROTHER"
 20060 DATA LIGHT, BULB, COLOR, TINT, AIRPLANE, "KITTY HAWK", ABOUT, AROUND, EARTH, "THIRD PLANET", ROUND, CIRCULAR, TOOTHS, WISDOM, PILLOW, "SLEEP TOOL"
 20070 DATA MOUSE, MICKEY, BELIEVE, UNDERSTAND, RECEIVE, OBTAIN, FEBRUARY, "SHORT MONTH", HOBBY, "FOR FUN", LAUGH, CHUCKLE, SEARCH, HUNT, FRUIT, APPLE
 30000 DATA "\$A-WORD"
 30010 DATA SHELF, "BOOK HOME", DINNER, TV, WINDOW, PANE, MACHINE, DEVICE, FINGERNAIL, CLIP, NEIGHBOR, "LIVES BY YOU", BALLOON, POP

30020 DATA DIRECTION, NORTH, SANDWICH, HAM, PRESIDENT, LEADER, NOTEBOOK, TABLE, ENGINE, TRAIN, ASLEEP, ZZZZ, LANGUAGE, TONGUE
 30030 DATA IMPOSSIBLE, MISSION, BACON, "PORK BELLY", FROZEN, ICE, NEEDLE, SEW, CAMERA, SNAPSHOT, CARDBOARD, BOX, BAREFOOT, "NO SHOES", BEAUTY, "SKIN DEEP", IMPORTANT, CRITICAL
 30040 DATA ANNOUNCE, NEWS, GARBAGE, TRASH, ALARM, BELLS, FARMER, DELL, SNEEZE, "BLESS YOU", GENERAL, "FOUR STAR", SPOON, KNIFE, WEIGHT, HEAVY
 30050 DATA CONTAIN, HOLD, FAMILY, KIN, MYSELF, ME, FAIRY, SPRITE, UNICORN, HORNED, STATUE, MONUMENT, MISCHIEVOUS, PLAYFUL
 30060 DATA MERCHANT, DEALER, RECIPE, CAKE, PSYCHOLOGY, SUPEREGO, ILLUSTRATION, DRAWING, TRUTH, HONESTY, PORTRAIT, PICTURE
 30070 DATA LANGUAGE, TONGUE, VEGETABLE, RHUBARB, COMPANY, GUESTS, TOMORROW, FUTURE
 30080 DATA SCREAM, HORROR, MINUTE, TIME, KNIFE, FORK, SCISSORS, CUT



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Pie Plot

Brian Flynn

A pie chart can graphically show how a whole is divided into parts. After entering values for up to nine "slices," this program quickly draws a chart and labels each piece. Ready to type in on all Apple II computers; compatible with color and monochrome monitors.

Pie charts are often used to illustrate percentages of a total. Whether you're dealing with components of a budget or total sales by salesperson, such a chart can quickly show you the parts of a whole. This program plots and draws a pie chart of up to nine slices. You can even label them yourself, and see each slice's percentage of the total. All you have to do is enter the values.

Pieces Of The Pie

Type in, save, and run "Pie Plot." The computer does most of the work for you. All you have to supply are the number of slices, the titles you want associated with each slice, and the value for each. The program computes the percentages.

Assume, for instance, that you want to compute and plot percentage sales for each of four employees of C. D. Bugs, a local insect exterminator. The table shows each salesperson's basic data.

Figure 1: Yearly Sales

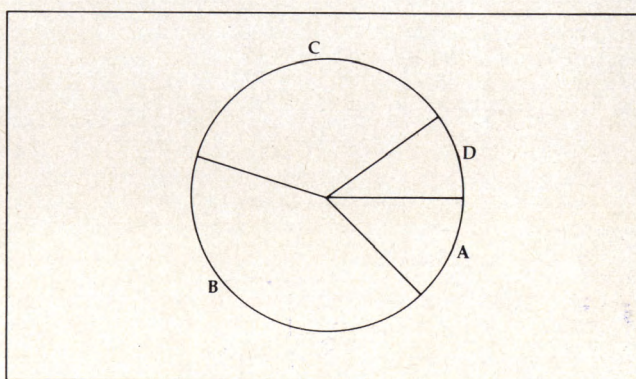
Employee	Sales
Al Borden	\$25,000
John Kowalski	50,000
Ruth Rhone	47,000
Babs Nixon	12,000

Since the example has four entries, press the 4 key and press RETURN. Then type in the title of each slice, in this case the last names of the

salespeople in the table. Up to eight characters can be entered for each title. Next enter the raw data for each slice. Those are the sales figures in the right-hand column of the table. Type in 25, 50, 47, and 12 (you don't need to type in the zeros indicating thousands). The computer calculates the percentages for you. Finally, type in a title for the pie chart, something like "PERCENTAGE SALES AT C. D. BUGS," for instance.

The pie chart appears in the center of the screen, each slice labeled A through D. At the bottom of the screen is the prompt *ANALYZE A SLICE (Y, N)?* Press Y and the letter of the slice you want to analyze. The slice title, as well as its percentage of the whole, displays.

Figure 2: Pie Chart



Percentage Sales At C. D. Bugs
Analyze a slice (Y/N)? ■

Any slice less than 2.5 percent of the total will be drawn but not labeled, because of the lack of room. The percentage, however, may still be analyzed.

The program faithfully represents percentages, but has difficulty representing vertical lines on the screen when you're using a color monitor. If you ask for a pie chart divided into four equal sections, for example, the labels will be placed correctly, but there will be no vertical line. You may want to specify a monochrome monitor to avoid this problem.

Technical Note

Line 370 contains the aspect ratio of your video screen. This ratio determines how circular the pie chart is drawn. To determine the aspect ratio, type in and run the following program.

```
10 HOME: HGR: HCOLOR=3
20 HPLOT 0,0 TO 150,0
30 HPLOT 0,0 TO 0,150
40 GETS$: TEXT
```

Measure the two lines, and divide the length of the horizontal line by the length of the vertical line. The result is the aspect ratio. Use this figure in line 370 of Pie Plot.

This program allows you to select color or monochrome display. However, if you're using a color television set instead of a color monitor made expressly for computers, you may notice a bit of blurring at the edges of some letters. If this becomes a problem, tell the Apple when you run Pie Plot that you're *not* using a color display. Resolution (now black and white) sharpens, and the computer never knows the difference.

Pie Plot

Refer to "Guide To Typing In Programs" before entering this listing.

```
100 REM PIE PLOT
110 REM INITIALIZE
120 GOSUB 210
130 REM ENTER DATA
140 GOSUB 490
150 REM COMPUTE
160 GOSUB 1010
170 REM PLOT
180 GOSUB 1210
190 TEXT : HOME : PRINT "BYE-BYE"
200 END
210 REM INITIALIZE
220 PRINT CHR$(21): TEXT : HOME
230 REM TITLE
240 GOSUB 280
250 REM GREETING
260 GOSUB 320
270 RETURN
280 REM TITLE
290 VTAB 12: HTAB 16: PRINT "PIE PLOT"
300 FOR PAUSE = 1 TO 1500: NEXT
310 RETURN
320 REM GREETING
330 HOME
340 PI = 3.14159
350 DT = PI / 200
360 RADIUS = 55
370 AR = 1: REM ASPECT RATIO (LENGTH
    OF VERTICAL TO HORIZONTAL AXIS)
380 DEF FN X(I) = 140 + RADIUS * COS
    (I)
390 DEF FN Y(I) = 80 + RADIUS * AR *
    SIN (I)
400 REM MAXIMUM NUMBER OF SLICES
410 DATA 9
420 READ NX
430 DIM X(NX),NM$(NX),PCT(NX),RAD(NX),
    CRAD(NX)
440 PRINT " THIS PROGRAM PLOTS A PIE
    FOR YOU. UP
```

```
450 PRINT "TO ";NX;" SLICES ARE ALLOWE
    D, WITH EACH
460 PRINT "PIECE REPRESENTING ITS PERC
    ENTAGE OF
470 PRINT "THE TOTAL.
480 RETURN
490 REM ENTER DATA
500 REM NUMBER OF SLICES
510 GOSUB 590
520 REM NAME OF EACH SLICE
530 GOSUB 650
540 REM VALUES
550 GOSUB 770
560 REM TITLE
570 GOSUB 890
580 RETURN
590 REM NUMBER OF SLICES
600 VTAB 7: HTAB 31: PRINT SPC(9): CHR$
    (7)
610 VTAB 7: HTAB 1: INPUT "HOW MANY SL
    ICES DO YOU HAVE ? ";N$
620 N = INT ( VAL (N$))
630 IF N < 1 OR N > NX THEN 600
640 RETURN
650 REM NAMES
660 HOME
670 PRINT "PLEASE NAME EACH SLICE. UP
    TO 15
680 PRINT "CHARACTERS WILL BE SHOWN.";
    CHR$(7)
690 FOR I = 1 TO N
700 VTAB 5: HTAB 15: PRINT SPC(25)
710 VTAB 5: HTAB 1: PRINT "NAME NO. ";
    I; TAB(12)"=" ";
720 INPUT NM$(I)
730 IF NM$(I) = "" THEN PRINT CHR$(
    7): GOTO 700
740 IF LEN (NM$(I)) > 15 THEN NM$(I) =
    LEFT$(NM$(I),15)
750 NEXT
760 RETURN
770 REM VALUES
780 HOME
790 PRINT "PLEASE ENTER VALUES FOR EAC
    H SLICE.
800 PRINT "I'LL COMPUTE THE PERCENTAGE
    S."; CHR$(7)
810 FOR I = 1 TO N
820 VTAB 5: HTAB 15: PRINT SPC(20)
830 VTAB 5: HTAB 1: PRINT "SLICE NO. "
    ;I; TAB(13)"=" ";
840 INPUT V$
850 X(I) = VAL (V$)
860 IF X(I) < = 0 THEN 820
870 NEXT
880 RETURN
890 REM TITLE
900 HOME
910 PRINT "PLEASE TITLE YOUR PLOT. UP
    TO 40
920 PRINT "CHARACTERS WILL BE DISPLAYE
    D.
930 VTAB 5: HTAB 1: INPUT "TITLE = ? "
    ;TITLE$
940 IF LEN (TITLE$) > 40 THEN TITLE$ =
    LEFT$(TITLE$,40)
950 VTAB 9: HTAB 1: PRINT "ARE YOU USI
    NG A COLOR MONITOR (Y/N) ? "; CHR$
    (7);
960 GET S$
970 IF S$ < > "Y" AND S$ < > "Y" AND
    S$ < > "N" AND S$ < > "N" THEN 9
    50
```



```

980 C1 = 0:C2 = 3:C3 = 0
990 IF S$ = "Y" OR S$ = "Y" THEN C1 =
    6:C2 = 5:C3 = 4
1000 RETURN
1010 REM COMPUTE
1020 REM TOTAL
1030 SUM = 0
1040 FOR I = 1 TO N
1050 SUM = SUM + X(I)
1060 NEXT
1070 REM PERCENTAGES
1080 FOR I = 1 TO N
1090 PCT(I) = X(I) / SUM
1100 NEXT
1110 REM EACH ANGLE IN RADIANS
1120 FOR I = 1 TO N
1130 RAD(I) = 2 * PI * PCT(I)
1140 NEXT
1150 REM CUMULATIVE ANGLES IN RADIANS
1160 CRAD(0) = 0
1170 FOR I = 1 TO N
1180 CRAD(I) = RAD(I) + CRAD(I - 1)
1190 NEXT
1200 RETURN
1210 REM PLOT
1220 HOME
1230 HGR : HCOLOR= C1: HPLOT 1,1: CALL
    62454
1240 REM BOX
1250 GOSUB 1370
1260 REM CIRCLE
1270 GOSUB 1430
1280 REM SLICES
1290 GOSUB 1480
1300 REM LABEL
1310 GOSUB 1560
1320 REM TITLE
1330 GOSUB 1670
1340 REM ANALYZE
1350 GOSUB 1710
1360 RETURN
1370 REM BOX
1380 HCOLOR= C3: FOR I = 157 TO 159: HPLOT
    0,I TO 279,I: NEXT
1390 HCOLOR= C2
1400 HPLOT 0,0 TO 279,0: HPLOT TO 279
    ,156: HPLOT TO 0,156: HPLOT TO 0
    ,0
1410 HPLOT 1,1 TO 278,1: HPLOT TO 278
    ,155: HPLOT TO 1,155: HPLOT TO 1
    ,1
1420 RETURN
1430 REM CIRCLE
1440 FOR I = 0 TO 2 * PI STEP DT
1450 HPLOT 140,80 TO FN X(I), FN Y(I)
1460 NEXT
1470 RETURN
1480 REM SLICES
1490 HCOLOR= C3
1500 FOR I = 1 TO N
1510 X = FN X(CRAD(I))
1520 Y = FN Y(CRAD(I))
1530 HPLOT 140,80 TO X,Y
1540 NEXT
1550 RETURN
1560 REM LABEL
1570 FOR I = 1 TO N
1580 IF PCT(I) < .025 THEN 1650
1590 V = CRAD(I - 1) + RAD(I) / 2
1600 X = 140 + (RADIUS + 12) * COS (V)
1610 Y = 80 + (RADIUS + 12) * AR * SIN
    (V)
1620 GOSUB 2000
1630 HCOLOR= 3
1640 ON I GOSUB 2060,2100,2150,2190,22
    30,2270,2300,2350,2390
1650 NEXT I
1660 RETURN
1670 REM TITLE
1680 L = LEN (TITLE$)
1690 VTAB 21: HTAB (21 - L / 2): PRINT
    TITLE$
1700 RETURN
1710 REM ANALYZE
1720 VTAB 23: HTAB 1: PRINT SPC( 40):
    VTAB 24: HTAB 14: PRINT SPC( 14)
1730 VTAB 23: HTAB 1: PRINT "ANALYZE A
    SLICE (Y/N) ? "; CHR$ (7);
1740 GET S$
1750 IF S$ = "N" OR S$ = "N" THEN 1840
1760 IF S$ < > "Y" AND S$ < > "Y" THEN
    1730
1770 REM CHOOSE
1780 GOSUB 1850
1790 REM DISPLAY PERCENTAGE
1800 GOSUB 1940
1810 VTAB 24: HTAB 14: INVERSE : PRINT
    "PRESS ANY KEY ";: NORMAL
1820 GET S$
1830 GOTO 1720
1840 RETURN
1850 REM CHOOSE
1860 VTAB 23: HTAB 1: PRINT SPC( 24)
1870 VTAB 23: HTAB 1: PRINT "WHICH ONE
    ? "; CHR$ (7);
1880 GET S$
1890 A = ASC (S$)
1900 IF A > 90 THEN A = A - 32
1910 NM = A - 64
1920 IF NM < 1 OR NM > N THEN 1870
1930 RETURN
1940 REM PERCENTAGE
1950 V = PCT(NM) * 100
1960 P = INT (V * 10 + .5) / 10
1970 VTAB 23: HTAB 1: PRINT SPC( 12)
1980 VTAB 23: HTAB 1: PRINT "SLICE "; CHR$
    (A);": ";NM$(NM);" = ";P;" %"
1990 RETURN
2000 REM BLACK BACKGROUND FOR LETTER
2010 HCOLOR= 0:X1 = X - 1:Y1 = Y + 1
2020 FOR L = X1 TO X1 + 6
2030 HPLOT L,Y1 TO L,Y1 - 8
2040 NEXT L
2050 RETURN
2060 REM A
2070 HPLOT X,Y TO X,Y - 4: HPLOT X + 4
    ,Y TO X + 4,Y - 4
2080 HPLOT X,Y - 2 TO X + 4,Y - 2: HPLOT
    X + 1,Y - 5: HPLOT X + 3,Y - 5: HPLOT
    X + 2,Y - 6
2090 RETURN
2100 REM B
2110 HPLOT X,Y TO X,Y - 6: HPLOT X,Y -
    6 TO X + 3,Y - 6
2120 HPLOT X,Y TO X + 3,Y: HPLOT X,Y -
    3 TO X + 3,Y - 3
2130 HPLOT X + 4,Y - 5: HPLOT X + 4,Y -
    4: HPLOT X + 4,Y - 1: HPLOT X + 4,
    Y - 2
2140 RETURN
2150 REM C
2160 HPLOT X,Y - 1 TO X,Y - 5: HPLOT X
    + 1,Y - 6 TO X + 3,Y - 6
2170 HPLOT X + 1,Y TO X + 3,Y: HPLOT X
    + 4,Y - 5: HPLOT X + 4,Y - 1

```



```

2180 RETURN
2190 REM D
2200 H$PLOT X,Y TO X,Y - 6: H$PLOT X,Y TO
X + 3,Y
2210 H$PLOT X,Y - 6 TO X + 3,Y - 6: H$PLOT
X + 4,Y - 1 TO X + 4,Y - 5
2220 RETURN
2230 REM E
2240 H$PLOT X + 4,Y TO X,Y: H$PLOT TO X
,Y - 6
2250 H$PLOT TO X + 4,Y - 6: H$PLOT X,Y -
3 TO X + 3,Y - 3
2260 RETURN
2270 REM F
2280 H$PLOT X,Y TO X,Y - 6: H$PLOT TO X
+ 4,Y - 6: H$PLOT X,Y - 3 TO X + 3
,Y - 3
2290 RETURN
2300 REM G
2310 H$PLOT X,Y - 1 TO X,Y - 5: H$PLOT X
+ 1,Y - 6 TO X + 4,Y - 6
2320 H$PLOT X + 1,Y TO X + 4,Y: H$PLOT X
+ 4,Y - 1
2330 H$PLOT X + 4,Y - 2: H$PLOT X + 3,Y -
2
2340 RETURN
2350 REM H
2360 H$PLOT X,Y TO X,Y - 6: H$PLOT X + 4
,Y TO X + 4,Y - 6
2370 H$PLOT X,Y - 3 TO X + 4,Y - 3
2380 RETURN
2390 REM I
2400 H$PLOT X + 2,Y TO X + 2,Y - 6
2410 H$PLOT X + 1,Y TO X + 3,Y: H$PLOT X
+ 1,Y - 6 TO X + 3,Y - 6
2420 RETURN

```

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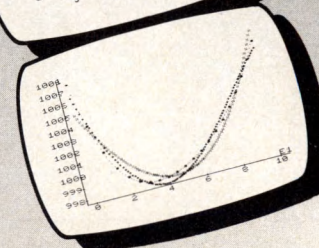
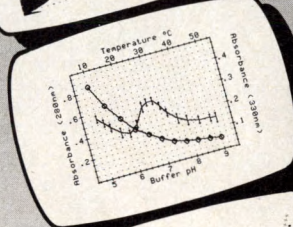
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Guide To Typing In Programs

What Is A Program?

A computer cannot perform any task by itself. Like a car without gas, a computer has *potential*, but without a program, it isn't going anywhere. Most of the programs published in this book are written in a computer language called BASIC. BASIC is easy to learn and is built into all Apple II series computers.

BASIC Programs

Computers can be picky. Unlike the English language, which is full of ambiguities, BASIC usually has only one right way of stating something. Every letter, character, or number is significant. A common mistake is substituting a letter such as O for the numeral 0, a lowercase l for the numeral 1, or an uppercase B for the numeral 8. Also, you must enter all punctuation such as colons and commas just as they appear in the magazine. Spacing can be important. To be safe, type in the listings exactly as they appear. Unlike other program listings you may have seen, those in this magazine have no special characters which you need to interpret. Simply enter the programs as they appear here.

DOS 3.3 And ProDOS

Unless otherwise mentioned in the program's documentation, it doesn't matter whether you have DOS 3.3 or ProDOS. You can enter the programs with either DOS active in your Apple. Of course, you can only run a typed-in program with the DOS system it was entered with.

Uppercase

You'll notice that all the program listings are entirely in uppercase. If you have an Apple IIe or IIc, however, which allows both uppercase and lowercase, you can change text which appears in PRINT statements if you want. A program such as "Spelling Bee," for instance, could be modified so that the screen displays appear in both uppercase and lowercase.

DATA Statements

Some programs contain a section or sections of DATA statements. These lines provide information needed by the program. Some DATA statements contain actual programs (called machine language); others contain graphics codes. These lines are especially sensitive to errors.

If a single number in any one DATA statement is mistyped, your machine could lock up, or crash. The keyboard may seem dead, and the screen may go blank. Don't panic—no damage is done. To regain control, you have to turn off your computer, then turn it back on. This will erase whatever program was in memory, *so always save a copy of your program before you run it*. If your computer crashes, you can load the program and look for your mistake.

Sometimes a mistyped DATA statement will cause an error message when the program is run. The error message may refer to the program line that READs the data. *The error is still in the DATA statements, though.*

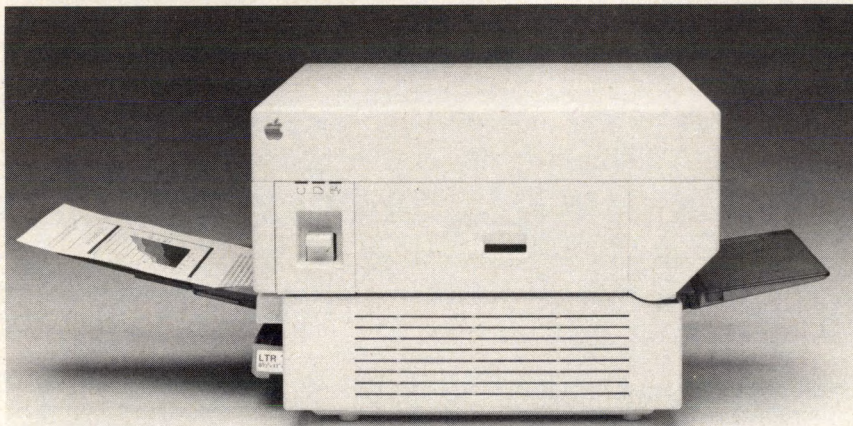
Get To Know Your Machine

You should familiarize yourself with your computer before attempting to type in a program. Learn the statements you use to store and retrieve programs from tape or disk. You'll want to save a copy of your program, so that you won't have to type it in every time you want to use it. Learn to use your machine's editing functions. How do you change a line if you make a mistake? You can always retype the line, but you at least need to know how to use the left and right arrow keys. It's all explained in your computer's manuals.

A Quick Review

1. Type in the program a line at a time, in order. Press RETURN at the end of each line. Use the left arrow to correct mistakes.
2. Check the line you've typed against the line in the magazine. You can check the entire program again if you get an error when you run the program.

New Products



Apple's LaserWriter printer offers typeset-quality text and graphics to Macintosh business users.

The Macintosh Office, LCD Screen For The IIc

Apple Computer has announced two products which complement the Macintosh in the office. The LaserWriter printer, with offset-quality printing, supports all Macintosh fonts, as well as several other popular type fonts. Built-in software allows other computers, such as the IBM PC, to use the printer. Suggested retail price, including toner cartridge, is \$6,995.

The AppleTalk Personal Network connects up to 32 devices, allowing the Macintosh and other personal computers to share peripherals and communicate with each other. The suggested retail price of \$50 includes the AppleTalk connector and two meters of cable.

Apple has also made available an 80-column by 24-line liquid crystal display (LCD) for its IIc computer. All software will work with the new display, which comes with an adjustable, nonglare panel. The LCD screen has a suggested retail price of \$599.

Apple Computer, Inc., 20525 Mariani Ave. Cupertino, CA 95014

Circle Reader Service Number 150.

Fun, Learning, And Leisure From CBS

CBS Software recently introduced 12 new titles, spanning five categories: Preschool Time, Fun and Learning, School Time, Leisure Time, and Career Time. The new releases include *Mastering the ACT* (\$150), designed to help college-bound students prepare for higher-level testing; *The Sea Voyagers* (\$39.95), a learning game that teaches facts about New World explorers; *Many Ways to Say I Love You* (\$29.95), which lets children design their own greeting cards; and *Interplanetary Pilot* (\$39.95), a space flight simulator. All programs are available for the Apple II+, IIe, and IIc.

CBS Software, One Fawcett Place, Greenwich, CT 06836

Circle Reader Service Number 151.

Apple Digitizer

Digital Vision has announced a video acquisition system for the Apple II series computers. Computereyes is a slow-scan device which connects between any standard video source and the Apple's game I/O port. Under software con-

trol, a black and white image is acquired in less than five seconds.

Suggested retail price for Computereyes is \$129.95. A video camera is included in the complete system package, which sells for \$349.95.

Digital Vision, Inc., 14 Oak St. Suite 2, Needham, MA 02192

Circle Reader Service Number 152.

Newsroom On A Disk

Journalism students can create and print an actual newspaper using *The Newsroom*, a new software product from Springboard Software. Positioned as an educational tool for junior and senior high school students, the program helps develop all areas of editorial and production skills. A printout of each finished version can be made—even used as a school newspaper.

Suggested retail price of *The Newsroom* is \$49.95.

Springboard Software, 7807 CreekrIDGE Circle, Minneapolis, MN 55435

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Professional Typesetting

PageMaker, a typesetting program for the Macintosh, has been announced by Aldus Corporation for release in the second quarter of 1985. Used with a 512K Macintosh or the Macintosh XL (Lisa), along with the Apple LaserWriter printer, *PageMaker* gives even the smallest office professional-looking price lists, reports, brochures, or anything else that would ordinarily be typewritten. Text and graphics created with *MacWrite*, *MacPaint*, and *MacDraw* can be formatted, placed, cropped, and typeset without pasteup and camera work.

Suggested retail price is \$495.

Aldus Corporation, 616 1st Ave., Suite 400, Seattle, WA 98104

Circle Reader Service Number 154.

Mac Animation

VideoWorks is Hayden Software's new animation creation program for the Macintosh. This program, created by the designers of *MusicWorks*, lets the user create animation by traditional cel animation or by inputting real-time sequence of events with the mouse. Once the animation sequences are in the system, the user can use Cut, Copy, or Paste to rearrange the animation's order.

Body Shop, a companion program, consists of human arms, legs, torsos, and heads which can be pasted into *VideoWorks* for realistic animations.

Hayden Software, 600 Suffolk St., Lowell, MA 01854

Circle Reader Service Number 155.

Presentation/Communications Graphics

The Digital Paintbrush System (\$299), a hardware and software graphics package, has been announced by The Computer Colorworks. Designed for users of the Apple II+, IIe, and IIc, this system integrates the preparation of sophisticated graphics with telecommunications, presentation, and printout capabilities.

Hardware includes a ball point pen-like input device and two rotating sensors connected to the pen tip by control lines. Graphics can be created, mixed with text, stored, organized, displayed, and printed on paper or acetate. The Graphics Telephone program enables two people to simultaneously create, edit, save, and print out drawings when computers are linked by modem.

The Computer Colorworks, 3030 Brideway, Sausalito, CA 94965

Circle Reader Service Number 156.



Prairie Power's new portable power system, shown here in its case, provides eight hours of power to the IIc and a LCD screen.

Portable Power

A complete portable power system for the Apple IIc has been announced by Prairie Power Systems. A 12-volt rechargeable battery gives up to eight hours of power to the IIc computer and Apple's flat-panel LCD screen.

Featuring a low-power alarm, the system is maintenance free, can be used in any position, and comes in its own padded case which can also house the computer, screen, and even a modem.

Suggested price is \$269.95, which includes battery, case, four-function charger, wall transformer, and all necessary cables.

Prairie Power Systems, 768 Twelve Oaks Center/15500 Wayzata Blvd., Wayzata, MN 55391

Circle Reader Service Number 157.

Macintosh Graphics Tablet

Tracing and entering existing drawings, charts, and graphs is as easy as putting pen to paper with Summagraphics' recently announced graphics tablet for the Macintosh. The 6 x 9 inch MacTablet and stylus allow users to trace from a single sheet of paper or from originals up to a half inch thick. MacTablet is compatible with *MacDraw*, *MacPaint* and all other Macintosh software.

This graphics tablet retails for \$495.

Summagraphics Corporation, 777 State St. Extension, Fairfield, CT 06430

Circle Reader Service Number 158.

Tax Time

Vision Information Products offers *TaxVision*, an income tax analysis and preparation package for users of Microsoft's *Multiplan*. This inte-

grated set of templates can be an alternative to dedicated tax programs.

Screens prompt entries and display results. *TaxVision* supports a wide range of tax schedules and forms.

Available for the Apple II/III series of computers, *TaxVision* retails for \$89.

Vision Information Products, Inc., 5500 Atherton St., Suite 306, Long Beach, CA 90815

Circle Reader Service Number 159.

Math Programs At Home

Four educational programs that teach math skills to children from grades two through eight have been announced by Random House Software. Available for the Apple II+, IIe, and IIc, the four packages are home versions of the *Galaxy Math* series, widely used in schools.

Galaxy Math: Basic Math Facts allows children to practice addition, subtraction, multiplication, and division of single-digit numbers. *Galaxy Math: Fractions*, designed for children in grades four to seven, offers fraction practice. *Galaxy Math: Decimals*, for grades four to eight, tests knowledge of decimals and percents. *Galaxy Math: Integers* is designed for grades six to eight, and stresses adding, subtracting, multiplying, or dividing positive and negative numbers.

Each program retails for \$29.95.

Random House Software, 201 East 50th St., New York, NY 10022

Circle Reader Service Number 160.

Apple Fantasy Games

The fourth title in the *Ultima* series of fantasy/role-playing games has been introduced by Origin Systems, Inc. *Ultima IV: Quest of the Avatar* is 16 times larger than any previous version, allowing a greater variety of combat situations and characters. Set in the land of Brittania, survival is the object, magic is prevalent, and one's soul the ultimate frontier.

Ultima IV, available for the Apple II family, retails for \$59.95.

Origin Systems, Inc., 1545 Osgood St. #7, N. Andover, MA 01845

Circle Reader Service Number 161.

Hard Disk/File Server

Up to 33 megabytes of disk storage space are available with *The Keeper*, Micro-Design's recently announced hard disk system. The *Keeper* provides mass storage, file serving, and print serving/spooling, and connects to the Macintosh Office system with a single AppleTalk connection.

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Six configurations of The Keeper are offered, including combinations of fixed hard disk and 5 megabyte removable hard disk cartridges. Retail prices start at \$2095 for a 10 megabyte hard disk.

Micro-Design, 6301 Manchaca Rd., Austin, TX 78745

Circle Reader Service Number 161.

Resurrect Dead Data

Penguin Software, publisher of graphics tools and adventure games, has announced a disk fix utility for the Apple II, II+, IIe, and IIc. *Disk Repair Kit* (\$29.95) can repair most disk damage automatically. If the disk's catalog is completely destroyed, the program scans the remainder of the disk to find files. It examines each file in several different formats to determine what it is, and resets its name and file type.

Disk Repair Kit can also selectively format tracks, map used or bad sectors, and search disks for strings or patterns of bytes.

Penguin Software, 830 Fourth Ave., P.O. Box 311, Geneva, IL 60134

Circle Reader Service Number 163.

Personal Financial Planning

Timeworks, a publisher of personal productivity and educational software, has joined forces with the editors of *Sylvia Porter's Personal Finance Magazine* to produce a line of personal finance software. The first program in the series, *Sylvia Porter's Personal Financial Planner*, was recently introduced. Priced at \$99, this program helps users achieve their financial goals through budget and cash flow management, and asset and liability monitoring. The second program in the series, *Sylvia Porter's Investment Planner*, tracks and analyzes personal investments. Each program in the series can be integrated with the others.

Timeworks, Inc., 444 Lake Cook Rd., Deerfield, IL 60015

Circle Reader Service Number 164.

Make A Book

Scarborough Systems' new *Build-a-Book* software kit allows children to create a story, print it out, and bind it into a durable four-color book.

Two sets of 32 four-color illustrated pages are used to print out the story. Several titles are presently available: *The Mystery of Scented Mountain*, *The Holiday Dragon*, *Adventure on Riddle Planet*, and *The Greatest Circus Story Ever Told*.

Other adventure and fantasy titles

are planned.

The software kit runs on the Apple II family of computers, and is priced at \$34.95. Additional sets of two books (covers and illustrated pages) are available at \$19.95.

Scarborough Systems, Inc., 25 N. Broadway, Tarrytown, NY 10591

Circle Reader Service Number 165.

Science Fiction And World Geography

Brøderbund has announced that *Cyborg*, a science fiction adventure game popular with Apple II owners (originally published by Sentient Software), is now available for the Macintosh. In *Cyborg*, you take the role of a being who is half-human and half-computer. Players must maintain a balance between man and machine. *Cyborg* includes an interactive control panel used with the mouse, which saves time typing in commands.

Where in the World Is Carmen Sandeigo? is Brøderbund's new mystery adventure game which teaches world geography. The game includes a copy of the 1985 *World Almanac and Book of Facts*, which is essential to finding clues to the criminal's whereabouts. Players solve the mystery by selecting options from a menu rather than typing in instructions. It is available for the Apple II series computers.

Suggested retail price for each program is \$39.95.

Brøderbund Software, 17 Paul Drive, San Rafael, CA 94903

Circle Reader Service Number 166.



In *Where in the World Is Carmen Sandeigo?*, players solve the mystery by picking items from menus.

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Apple III	<input type="checkbox"/> 206	<input type="checkbox"/> 207
Macintosh	<input type="checkbox"/> 208	<input type="checkbox"/> 209
Lisa	<input type="checkbox"/> 210	<input type="checkbox"/> 211
Other _____	<input type="checkbox"/> 212	<input type="checkbox"/> 213

(please specify)

2. Where do you usually use your Apple computer?

At home/home office	<input type="checkbox"/> 214
At a business office	<input type="checkbox"/> 215
Both office and home	<input type="checkbox"/> 216
In the classroom	<input type="checkbox"/> 217
Other _____	

218

3. Do you plan to purchase a personal computer in the next 12 months?

Yes	<input type="checkbox"/> 219
No	<input type="checkbox"/> 220
Don't know	<input type="checkbox"/> 221

4. Do you plan to purchase software in the next 12 months?

Yes	<input type="checkbox"/> 222
No	<input type="checkbox"/> 223
Don't know	<input type="checkbox"/> 224

5. Which of the following peripherals do you own or use? (check all that apply)

Disk Drive	<input type="checkbox"/> 225
Joystick (or game peripheral)	<input type="checkbox"/> 226
Modem	<input type="checkbox"/> 227
Monitor	<input type="checkbox"/> 228
Printer	<input type="checkbox"/> 229
Other (please specify) _____	

230

6. Which of the following peripherals do you plan to purchase in the next 12 months? (check all that apply)

Disk Drive	<input type="checkbox"/> 231
Joystick (or game peripheral)	<input type="checkbox"/> 232
Modem	<input type="checkbox"/> 233
Monitor	<input type="checkbox"/> 234
Printer	<input type="checkbox"/> 235
Other (please specify) _____	

236

7. Approximately how much do you plan to spend on your computer or computer-related items in the next 12 months?

Under \$100	<input type="checkbox"/> 237
100-499	<input type="checkbox"/> 238
500-999	<input type="checkbox"/> 239
1000-1999	<input type="checkbox"/> 240
2000 or over	<input type="checkbox"/> 241
Don't know	<input type="checkbox"/> 242

8. Please put an X in the box which indicates your age group.

Under 18	<input type="checkbox"/> 243
18-29	<input type="checkbox"/> 244
30-44	<input type="checkbox"/> 245
45-65	<input type="checkbox"/> 246
Over 65	<input type="checkbox"/> 247

9. What is the highest level you completed in school?

Some high school or less	<input type="checkbox"/> 248
High school graduate	<input type="checkbox"/> 249
Attended college 1-3 years	<input type="checkbox"/> 250
College graduate	<input type="checkbox"/> 251
Post-graduate study without degree	<input type="checkbox"/> 252
Master's degree	<input type="checkbox"/> 253
Doctoral degree	<input type="checkbox"/> 254

10. Would you describe your present occupation as

Student	<input type="checkbox"/> 255
Manufacturing/service	<input type="checkbox"/> 256
Clerical/technical	<input type="checkbox"/> 257
Sales	<input type="checkbox"/> 258
Educator	<input type="checkbox"/> 259
Professional	<input type="checkbox"/> 260
Other	<input type="checkbox"/> 261

11. What is the total combined annual income before taxes for all members of your household?

Less than \$10,000	<input type="checkbox"/> 262
10,000 to 14,999	<input type="checkbox"/> 263
15,000 to 19,999	<input type="checkbox"/> 264
20,000 to 24,999	<input type="checkbox"/> 265
25,000 to 34,999	<input type="checkbox"/> 266
35,000 to 49,999	<input type="checkbox"/> 267
50,000 to 74,999	<input type="checkbox"/> 268
75,000 or over	<input type="checkbox"/> 269

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Apple IIC	<input type="checkbox"/> 202	<input type="checkbox"/> 203
Apple IIE	<input type="checkbox"/> 204	<input type="checkbox"/> 205
Apple III	<input type="checkbox"/> 206	<input type="checkbox"/> 207
Macintosh	<input type="checkbox"/> 208	<input type="checkbox"/> 209
Lisa	<input type="checkbox"/> 210	<input type="checkbox"/> 211
Other _____	<input type="checkbox"/> 212	<input type="checkbox"/> 213

(please specify)

2. Where do you usually use your Apple computer?

At home/home office	<input type="checkbox"/> 214
At a business office	<input type="checkbox"/> 215
Both office and home	<input type="checkbox"/> 216
In the classroom	<input type="checkbox"/> 217
Other _____	

218

3. Do you plan to purchase a personal computer in the next 12 months?

Yes	<input type="checkbox"/> 219
No	<input type="checkbox"/> 220
Don't know	<input type="checkbox"/> 221

4. Do you plan to purchase software in the next 12 months?

Yes	<input type="checkbox"/> 222
No	<input type="checkbox"/> 223
Don't know	<input type="checkbox"/> 224

5. Which of the following peripherals do you own or use? (check all that apply)

Disk Drive	<input type="checkbox"/> 225
Joystick (or game peripheral)	<input type="checkbox"/> 226
Modem	<input type="checkbox"/> 227
Monitor	<input type="checkbox"/> 228
Printer	<input type="checkbox"/> 229
Other (please specify) _____	

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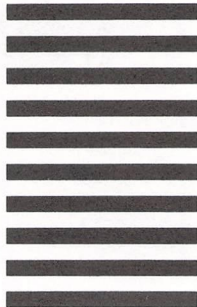
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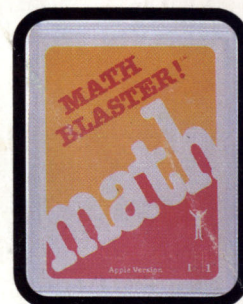


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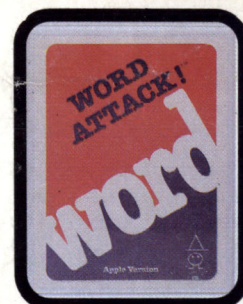


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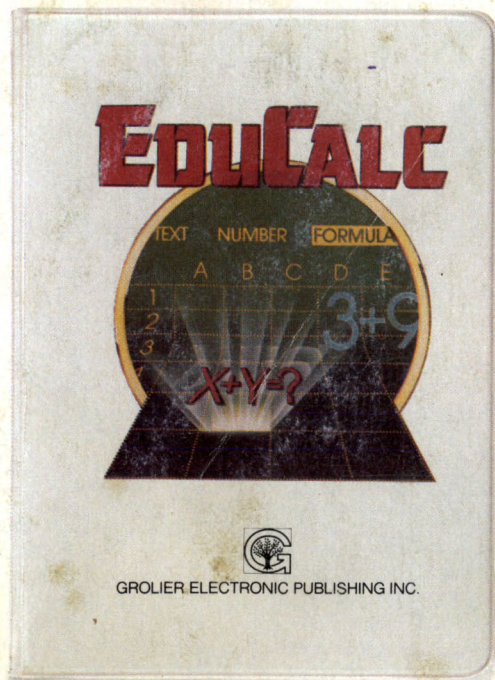
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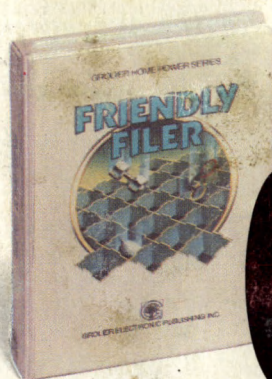
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